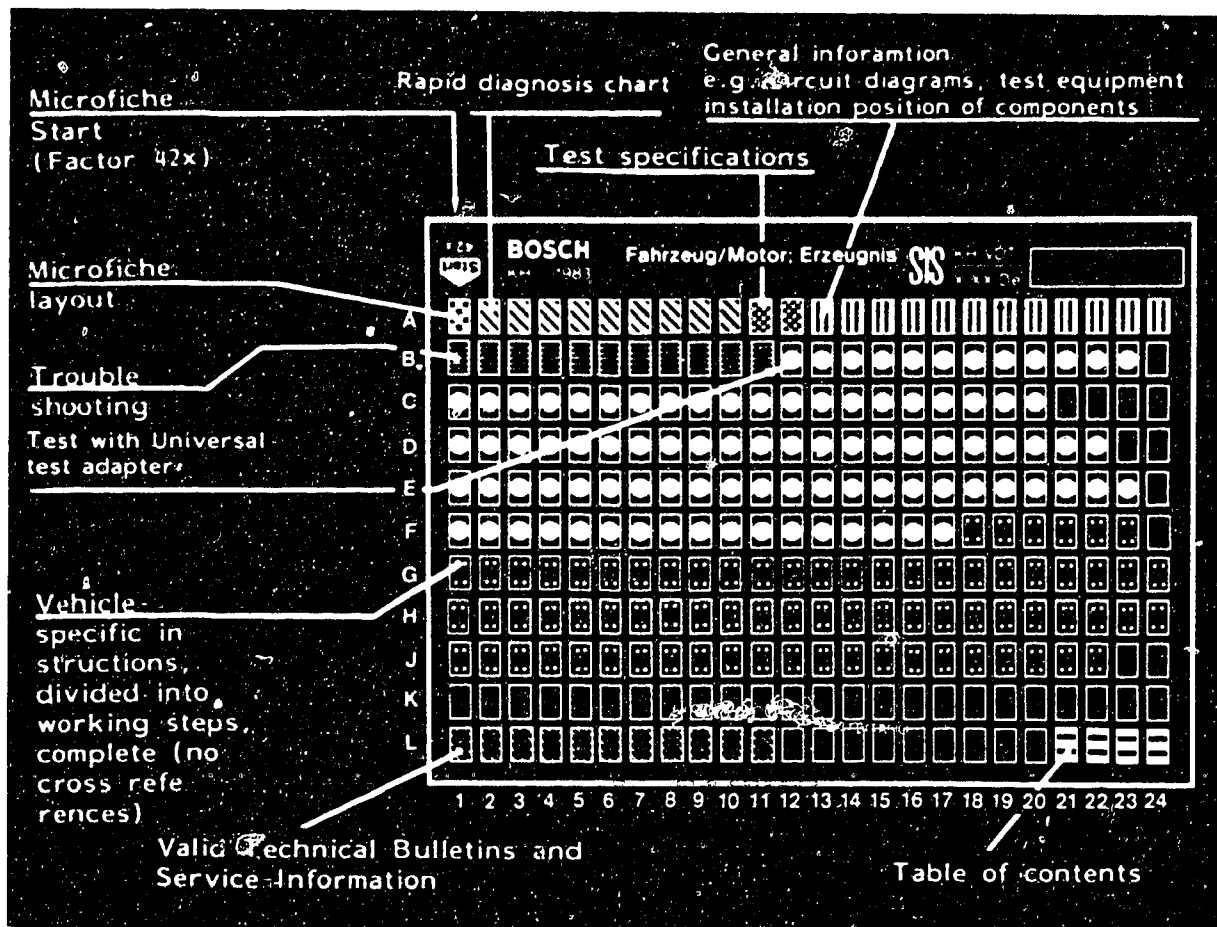


Microfiche layout



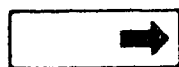
1. Read from left to right

2. Title of microfiche (appears on each coordinate)

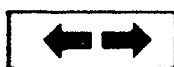
E 16	Product/assembly/test step	
	Vehicle/engine	

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C6

A1

Trouble-Shooting Plan



1. Rapid diagnosis chart for universal test adapter

The following rapid diagnosis chart makes it possible for the experienced Motronic expert to quickly check the electrical part of the system using the universal test adapter.











The rapid diagnosis chart contains the following information:

- Switch positions on universal test adapter
- Sequence of test steps
- Notes on how to operate the universal test adapter or other components
- Readings on the multimeter and motortester
- References to coordinates of the relevant detailed testing and trouble-shooting program.

If detailed information and instructions are necessary, always proceed according to the trouble-shooting program starting on Coordinate B1/B2.



Rapid diagnosis chart for universal test adapter

Test step	Switch position		Remarks	Test specifications (reading)	For trouble-shooting see Coordinate
	V	Ω			
1		1	Shift gear to neutral. Ignition off. Disconnect control unit. Measure insulation resistance of engine-speed sensor. Term. 8 against term. 5	Greater than 1M Ω	B 18
2		2	Measure insulation resistance of reference-mark sensor. Term. 25 against term. 5	Greater than 1M Ω	B 20
3		3	Measure winding resistance of engine-speed sensor. Term 8 against term 27	0.6...1.6 k Ω	B 22
4		4	Measure winding resistance of reference-mark sensor. Term. 25 against term 26	0.6...1.6 k Ω	C 5
5		5	Measure resistance of engine temperature sensor (NTC II). Term. 13 against term 5	at 15° to 30°C: 1.45...3.3 k Ω (depends on temperature)	C 11
6		6	Measure resistance of air temperature sensor (NTC I). Term. 22 against term. 5	at 15° to 30°C: 1.45...3.3 k Ω (depends on temperature)	C 13
7		7	Measure resistance. Term. 10 against term. 5	$\infty\Omega$	C 15
8		8	Deleted	---	---
9		9	Accelerator in rest position. Measure resistance of idle contact. Term 2 against term. 5	Less than 15 Ω	C 17
10		10	Accelerator in full-load position. Measure resistance of full-load contact. Term. 3 against term. 5	Less than 15 Ω	C 21

A3

Rapid diag. ch. for univ. test adapter
Porsche 944

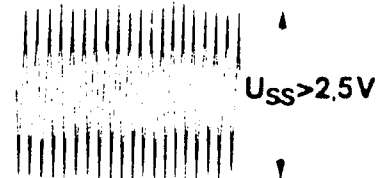
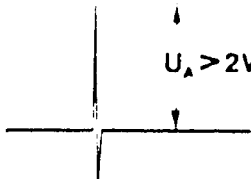
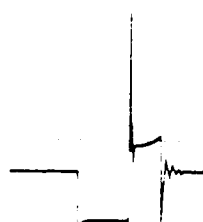


A4

Rapid diag. ch. for univ. test adapter
Porsche 944



Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		Remarks	Test specifications (reading)	For trouble-shooting see Coordinate
	V	Ω			
11	↓	11	Measure resistance. Ground term. 16 against term. 5	Less than 15 Ω	D 1
12	↓	12	Measure resistance. Ground term. 17 against term. 5	Less than 15 Ω	D 3
13	↓	13	Measure resistance. Ground term. 19 against term. 5	Less than 15 Ω	D 5
14	↓	14	Deleted	---	---
15		15	Deleted	---	---
16	1	15	Measure signal with oscilloscope. Engine-speed sensor term. 8 against term. 27. Shift gear to neutral and crank engine.		D 7
17	2	15	Measure signal with oscilloscope. Reference-mark sensor term. 25 against term. 26. Shift gear to neutral and crank engine.		D 13
18	3	15	Deleted	---	---
19	4	15	Deleted	---	---
20	5	15	Ignition off. Connect control unit. Ignition on. Measure ignition signal with oscilloscope. Shift gear to neutral and crank engine. Control unit, ignition output stage term. 1 against term. 5 Only replace control unit if test steps 21, 22 and 23 O.K.		D 19
21	6	15	Measure voltage at relay set. Term. 35 against term. 5	10...15 V	D 21
22	7	15	Measure voltage at relay set. Term. 18 against term. 5	10...15 V	E 1

A5

Rapid diag. ch. for univ. test adapter
Porsche 944

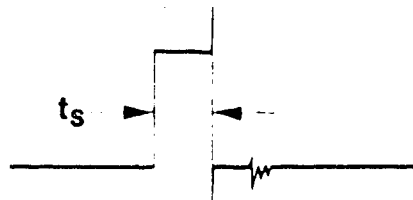
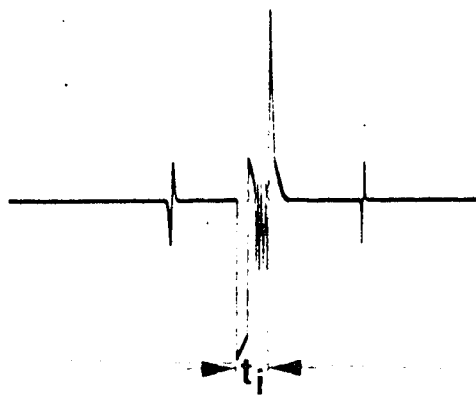
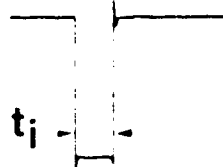


A6

Rapid diag. ch. for univ. test adapter
Porsche 944



Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		But- ton	Remarks	Test specifications (reading)	For trouble- shooting see Coordinate
	V	Ω				
23	8	15		Measure voltage at control unit. Term. 9 against term. 5	Greater than 8 V	E 3
24	9	15		Measure voltage at air-flow sensor. Term. 7 against term. 5 Air-flow sensor flap in rest position:	150...250 mV	E 5
				Air-flow sensor flap open:	Greater than 8 V	
25	10	15		Deleted	---	---
26	11	15		Deleted	---	---
27	12	15		Measure voltage. Starting signal term. 50. Term 4 against term. 5	8...15 V	E 7
28	13	15		Test dwell-period signal t_s from control unit with oscilloscope. Term. 21 against term. 5 Shift gear to neutral and crank engine.		E 9
29	14	15		Test injection signal t_i from control unit with oscilloscope. Term. 14 against term. 5. Shift gear to neutral and crank engine.		E 11
30	14	15	T1	As 29, but duration of injection becomes slightly longer after pressing button (NTC II, cold).		E 13
31	15	15		As test step 29, but term. 15 against term. 5		E 15
32	16	15		Measure injection signal t_i from control unit with oscilloscope. Term. 11 against term. 5. Shift gear to neutral and crank engine.		E 17

A7

Rapid diag. ch. for univ. test adapter
Porsche 944



A8

Rapid diag. ch. for univ. test adapter
Porsche 944



Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch Position		But-ton	Remarks	Test specifications (reading)	For trouble-shooting see Coordinate
	V	Ω				
33	17	15		Measure voltage at pump relay Term. 20 against Term. 5. Ignition on	10...15 V	E 19
34	17	15		Measure voltage. Shift gear to neutral and crank engine. Control unit, active pump control. Term. 20 against Term. 5	max..4 V	E 21
35	17	15	T 3	Ignition off. Connect pressure gauge. Ignition "ON". Press button T3. Read off fuel pressure.	2.3...2.7 bar	E 23
36	17	15		Connect motortester. Connect CO analyzer. Let engine run. Test idle speed and CO.	800...850 min ⁻¹ 0.5...1.0 %CO	F 5
	17	15	T 2	As above, readings unchanged.		
37	17	15		Let engine run. Test spark advance at idle speed. Important! Idle speed must be between 800 and 850 min ⁻¹ . Otherwise, different spark advance is indicated.	5°...15°	F 9
	17	15	T 6	Test spark advance at full load. Set engine speed to 3000 min ⁻¹ and press T 6 (full-load button).	18°...28° with engine speed 3000 min ⁻¹	F 9
38	17	15		Dwell angle at idle speed	8°...15°	F 11
				Dwell angle at 3000 min ⁻¹	30°...45°	
39	17	15	T 5	Hold engine speed constant at 2000 min ⁻¹ . Press button T 5. Injection signals stop and start again at approx. 1200 min ⁻¹ .	Engine "hunts"	F 13

A9

Rapid diag. ch. for univ. test adapter
Porsche 944



A10

Rapid diag. ch. for univ. test adapter
Porsche 944



1. Test specifications

Idle speed

800...850 min⁻¹

B7

Exhaust-gas setting:

CO concentration with
engine at normal
operating temperature

0.5...1.0 % by vol. CO

Fuel pressure:

2.3...2.7 bar

Fuel pump delivery

at least 850 cm³/30 s

See equipment and autodata microfiches for settings for
ignition, valve clearance and other engine data.

Solenoid-operated injection valve:

Electrical internal
resistance

2...3 Ω

Air-flow sensor

B5

Resistance value between
terminals 6 and 7:

8 Ω ...1000 Ω

(air-flow sensor flap deflected)

terminals 6 and 9:

500 Ω ...800 Ω

Auxiliary-air device:

Electrical internal
resistance up to 8.82
as from 8.82

30...65 Ω

20...55 Ω

A11

Test specifications

Porsche 944



Temperature sensor I (NTC I air):

Electrical internal resistance

at + 15°C...+30°C: 1.45...3.3 k Ω

measured at air-flow

sensor between terminals

22 and 6 at +80°C: 280...360 Ω

B 7

Temperature sensor II (NTC II coolant):

Electrical internal resistance

at + 15°C...+30°C: 1.45...3.3 k Ω

at + 80°C: 280...360 Ω

Engine-speed sensor and reference-mark sensor

Electrical internal

resistance 0.6...1.6 k Ω

B 9

Throttle-valve switch

Resistance of idle

contacts (terminals 2 and
43): 0 Ω

Full-load contacts

(terminals 3 and 43): 0 Ω

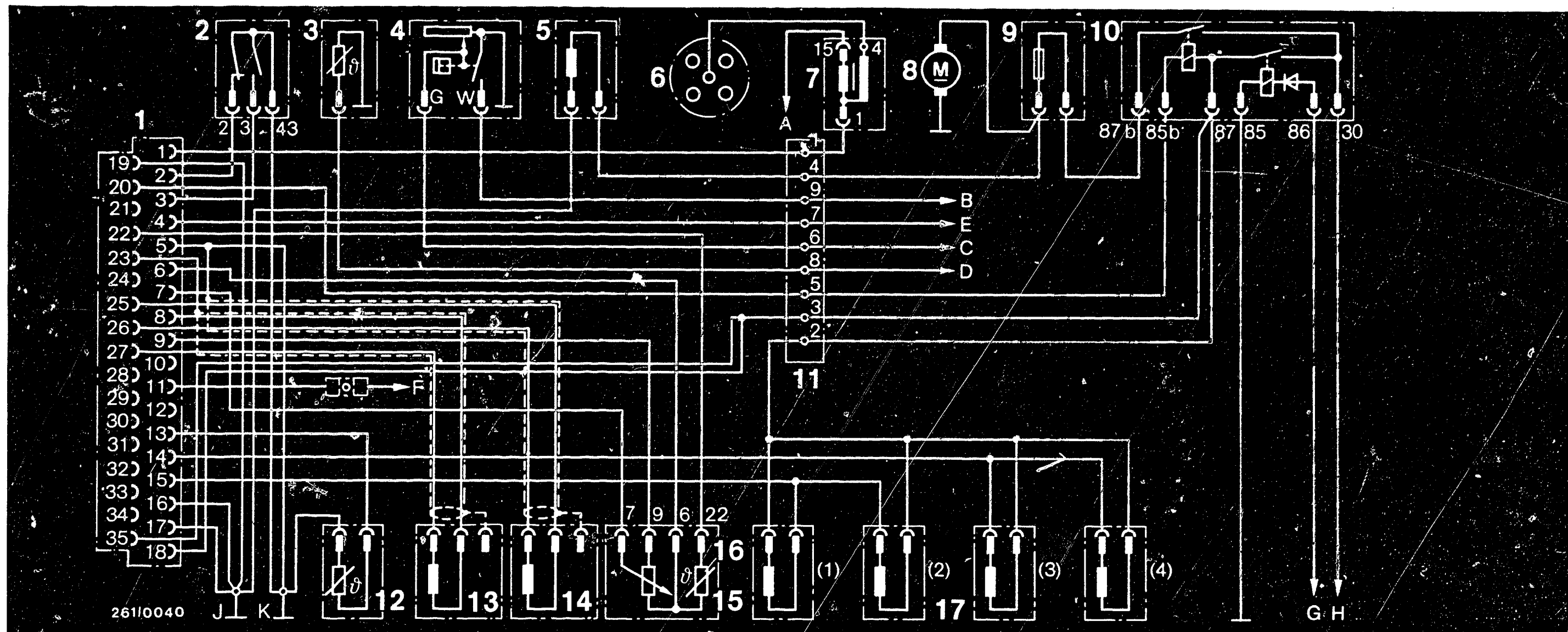
B 7

A12

Test specifications

Porsche 944





3. Electrical circuit diagram

1 = Motronic (DME) control unit
 2 = Throttle-valve switch
 3 = Water-temperature sensor
 4 = Oil-pressure sensor
 5 = Auxiliary-air device
 6 = High-tension distributor
 7 = Ignition coil
 8 = Fuel pump
 9 = Central fuse box
 fuse no. 2

10 = Pump and main relay
 (U on central electrics)
 11 = Plug connection in engine compartment
 12 = NTC temperature sensor engine II
 13 = Engine-speed sensor
 14 = Reference-mark sensor
 15 = Air-flow sensor
 16 = NTC temperature sensor I (air)
 17 = (1,2,3,4) = injection valves
 cyl. 4,3,2,1

A = To central electrics A 12
 B = To combi-instrument oil-
 pressure warning lamp WK
 C = To combi-instrument oil-
 pressure display G
 D = To combi-instrument water-
 temperature display G
 E = To starting motor terminal 50
 F = To consumption display
 G = To central electrics C 15
 H = To battery + (30)
 J = Drive housing ground
 K = Engine block ground

A13

Electrical circuit diagram

Porsche 944

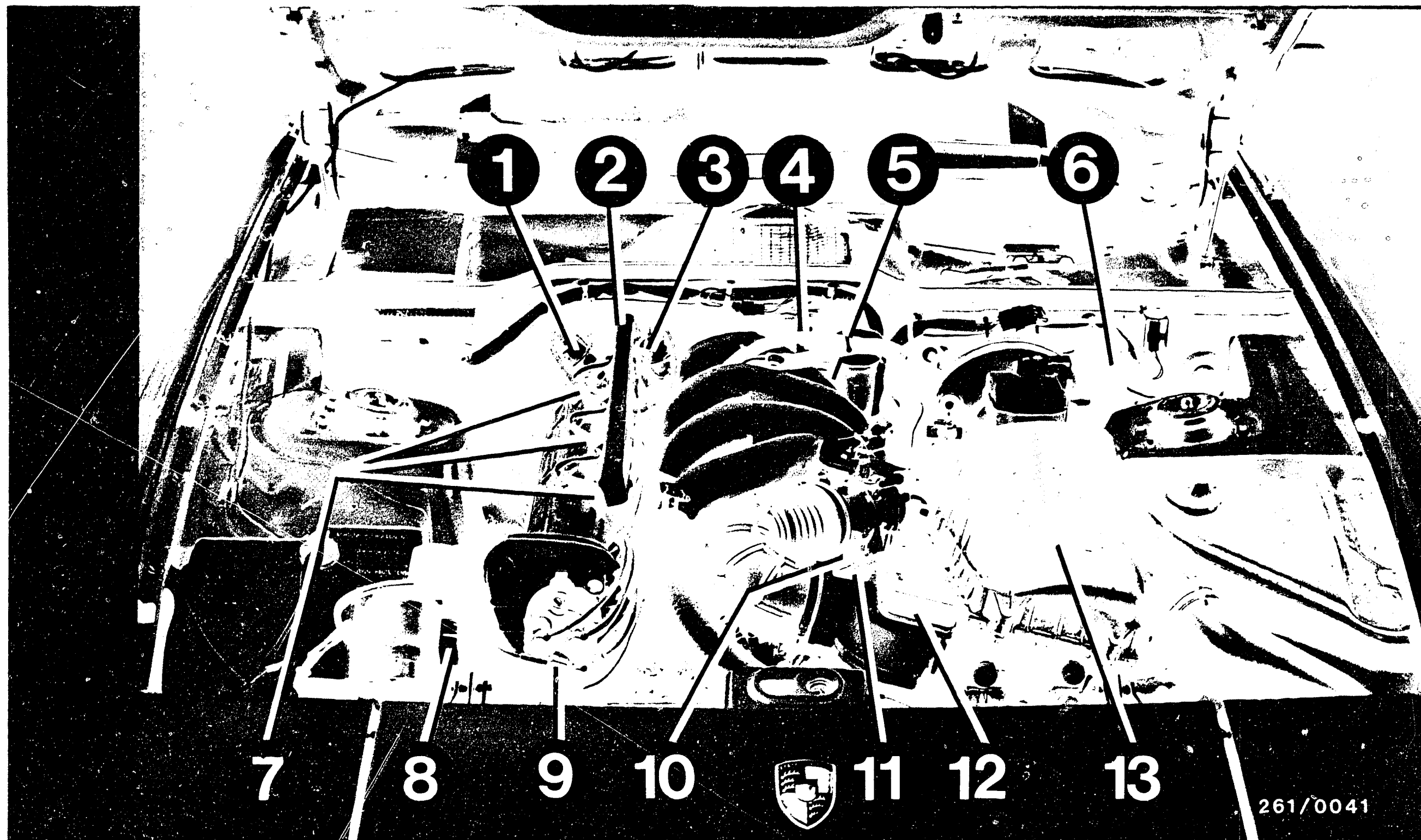


A14

Electrical circuit diagram

Porsche 944





4. Installation position of components

- 1 = Pressure regulator
- 2 = Fuel-distribution pipe
- 3 = Fuel-line-pressure damper
- 4 = Ground terminals for Motronic
- 5 = Engine-speed and reference-mark sensor

- 6 = Control unit (in passenger compartment)
- 7 = Solenoid-operated injection valves
- 8 = Ignition coil
- 9 = High-voltage distributor
- 10 = Temperature sensor II (engine)

- 11 = Throttle-valve switch
- 12 = Air-flow sensor
- 13 = Air filter

A15

Installation position of components
Porsche 944



A16

Installation position of components
Porsche 944

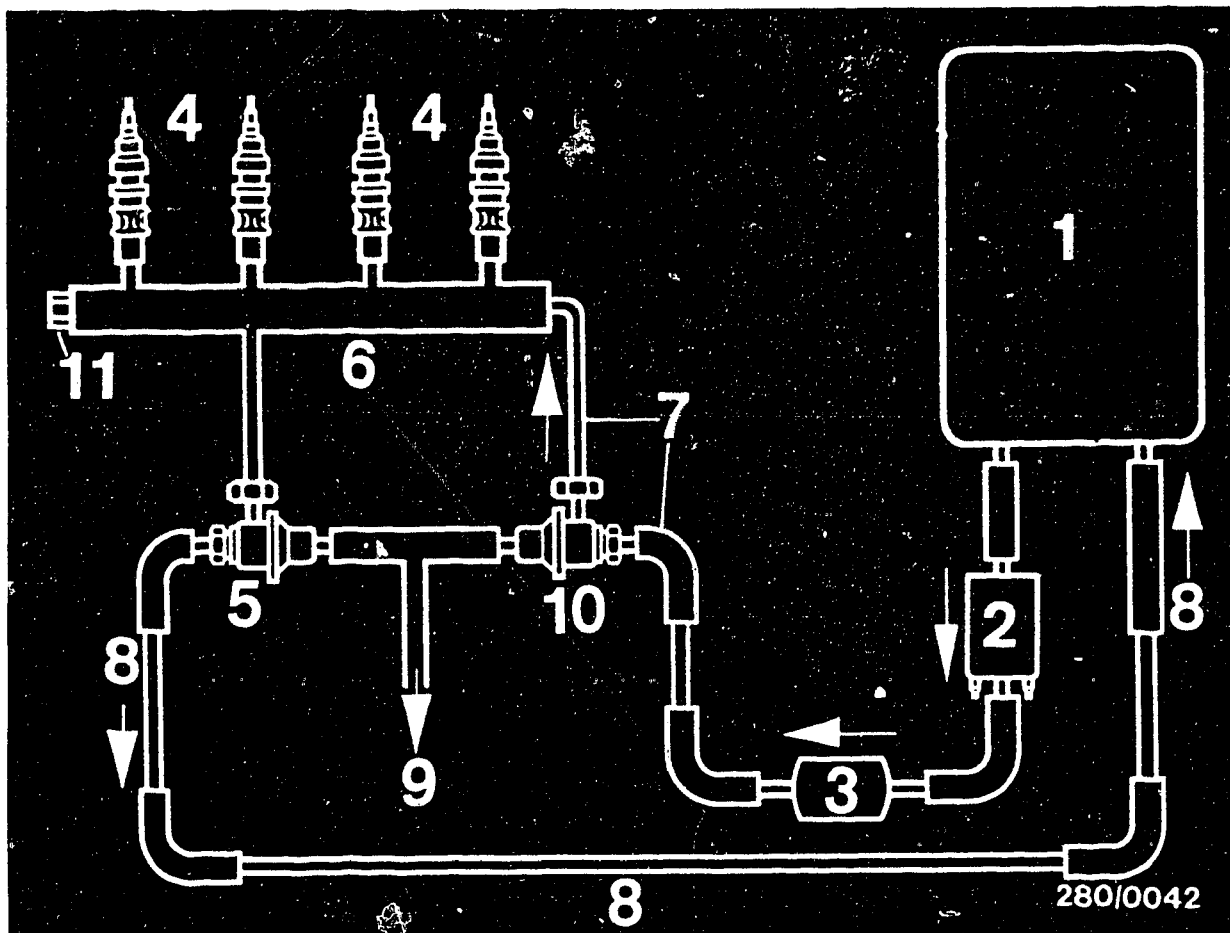


Installation position of components (continued)

The indications "right" and "left" always refer to the forward direction of travel.

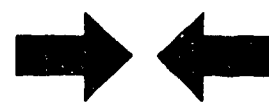
Reference-mark and engine-speed sensors:	On the crankcase flange below the oil-filling fitting
Relay 1 (fuel pump relay): combined with Relay 2 (main relay):	In the central electrics, relay U
Control unit:	Under the instrument panelling, in front of the steering column.
Temperature sensor I:	In the air-flow sensor
Temperature sensor II (engine):	On the left-hand engine side, between cyl. 1 and 2. Blue plug
Central ground:	On the drive housing, near engine-speed and reference-mark sensors.
Auxiliary-air device:	Under the suction distributor.





5. Diagram of fuel lines

- 1 = Fuel tank
- 2 = Fuel pump
- 3 = Fuel filter
- 4 = Solenoid-operated injection valves
- 5 = Pressure regulator
- 6 = Fuel-distributor pipe
- 7 = Fuel delivery line
- 8 = Fuel return line
- 9 = To intake manifold
- 10 = Fuel-line pressure-damper
- 11 = Test connection



6. Test equipment and tools		
<u>Description</u>	<u>Designation</u>	<u>Part No.</u>
Universal test adapter Adapter cable	ETT 018.01	0 684 101 801 1 684 463 124
Motortester	e.g. MOT 002.00 or 200	0 684 000 200
Exhaust-gas analyzer	e.g. ETT 008.02 or ETT 008.03	0 684 100 802 0 684 100 803
Multimeter (analog reading, internal resistance min. 20 k Ω /V)		Commercially available e.g. type MA 2H from Metrawatt or Chinaglia, Cortina model
Pressure gauge 6 bar or Pressure tester or Pressure tester (no longer available)	Quality class 1.0 0.1 bar graduations	1 687 231 154 KDJE-P 100 KDEP 1034
Three-way line as connection piece for KDJE-P100 and KDEP 1034		KDJE-P100/13



<u>Description</u>	<u>Part No.</u>
Feeler gauge for measuring the sensor air gaps (up to 1 mm)	Commercially available
Lubricant for engine-speed and reference- mark sensors	Molykote Longterm 2, commercially available
Chassis dynamometer e.g. LPS 96 or LPS 002	0 680 017 001 0 680 100 200
Electric connecting cable (test lead) for direct connection of the components under test, e.g. injection valves	KDJE 7450/70



7. Important general information

This information must be observed in order to prevent damage to the engine, control unit or ignition coil and for the safety of personnel.

7.1 Never start engine without securely connected battery.

7.2 Incorrect polarity of the supply voltage, e.g. by incorrect connection of the battery or ignition coil, can lead to irreparable damage to the control unit.

7.3 Do not use a fast charger for starting the engine.

Use only a second 12 V battery and jump leads.

Caution! Owing to different requirements of vehicle manufacturers with regard to electronic products we advise you not to use 24 V batteries as an aid for starting. Follow the vehicle owners manual.

7.4 Disconnect the battery from the vehicle electrical system before fast charging.



7.5 When charging the battery in the vehicle or when using a starting aid, follow the information in the operating instructions of the fast charger and also follow the information given by the vehicle manufacturer.

7.6 Never disconnect the battery from the vehicle electrical system with the engine running.

7.7 Do not short-circuit ignition coil term. 1 to ground (e.g. for stopping the engine). The ignition coil and possibly the control unit will suffer irreparable damage.

7.8 Never bring the positive pole of the battery into contact with ignition coil term. 1. The control unit will suffer irreparable damage.

7.9 Never connect or disconnect the wiring-harness plug of the control unit with the ignition switched on.

7.10 Remove the control unit at temperatures above 80°C (paint-drying installation).

7.11 Remove the control unit before performing welding work (electric spot welding).

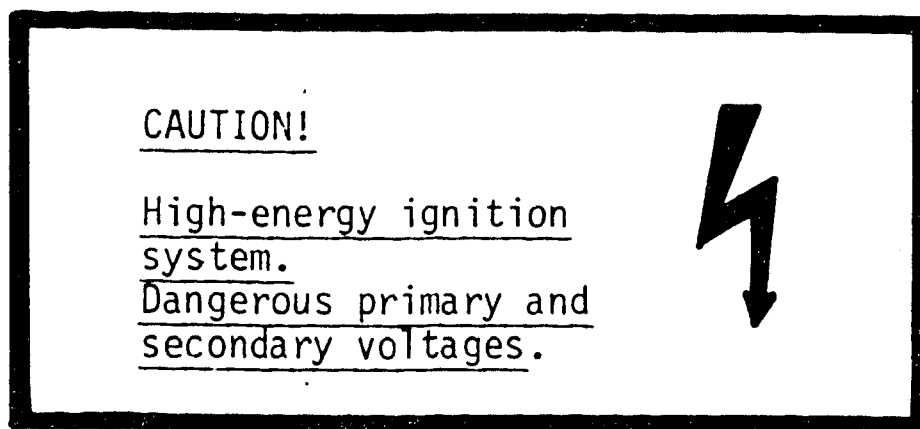
7.12 Remove the relay combination when performing a compression test. This prevents undesired injecting of the injection valves.



7.13 When installing an alarm system, follow the information given in the installation instructions for Motronic vehicles or follow technical bulletin "New Product" VDT-I-335/110 En.

It must be ensured that the alarm relay does not suffer interference from stray fields (e.g. from H.T. ignition cables), causing it to trip incorrectly.

7.14



The above sticker has the following meaning:

The Motronic contains a high-performance ignition system which can be dangerous if live parts or terminals are touched (both on the primary as well as secondary sides).



In this connection we should like to point out that the relevant legal regulations concerning work on electrical installations must be observed when testing or working on the ignition system.

The ignition must always be switched off when working on the ignition coil (switch off ignition/voltage source). Such work includes:

- Connection of engine testers (timing light, dwell-tach tester, ignition oscilloscope etc).
- Replacement of parts of the ignition system (spark plug, ignition coil, ignition distributor, ignition cable etc).

If, when testing the ignition system or when performing adjustments on the engine (e.g. carburetor), it is necessary to switch on the ignition (switch on ignition/voltage source), the above-mentioned dangerous voltages occur over the entire system.

There is, therefore, danger of accident not only on the individual components of the ignition system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also on the wiring harness (e.g. tachometer connection, diagnostic plug), on plug-in connections and on testers.



8. Trouble-shooting

The following trouble-shooting programs are designed to enable the workshop employees using the Universal test adapter and other suitable testers to quickly detect causes of trouble on the Motronic.

Depending on the level of training and experience of the mechanic a choice can be made between the following procedures:

- Detailed, step-by-step trouble-shooting for employees with little experience or practice on Motronic vehicles.
- Pin-pointed direct trouble-shooting for trained and experienced employees who have a great deal of practice on Motronic vehicles.

B3

B5

Both trouble-shooting programs start by checking the electrical/electronic part of the Motronic using the Motronic test adapter ETT 018.01. This makes it possible within a short space of time to check the electrical operation of the wiring harness with the connected components (including control unit) and to quickly locate faults.

If no fault is found using the Motronic test adapter, it is necessary to continue with the detailed or the direct trouble-shooting program.

B1

Trouble-shooting
Porsche 944



B2

Trouble-shooting
Porsche 944



8.1 Detailed, step-by-step trouble-shooting

8.1.1 Test with Motronic test adapter

This test must come at the start of the test program and must be performed from beginning to end.

8.1.2 Trouble-shooting according to customer complaints (fault symptoms)

The table below contains possible fault symptoms and the right-hand column gives the first coordinate of the respective detailed trouble-shooting program.

The trouble-shooting program consists of logically ordered test steps for all individual components of the Motronic. If, after completing the trouble-shooting program for an assumed symptom, the fault has not been located or remedied, choose a new fault symptom and work through the respective program.

<u>Customer complaints (fault symptom)</u>	<u>Test with test adapter</u>	<u>Coordinates</u>
1. Engine fails to start or starts only with great difficulty	B 11	F 17
2. Engine starts but then dies	B 11	G 5
3. Uneven engine idle	B 11	G 13
4. Poor throttle take-up	B 11	H 1
5. Engine missing under all operating conditions	B 11	H 11
6. Fuel consumption too high	B 11	H 21
7. No maximum engine power	B 11	J 3
8. CO concentration at idle too high or too low	B 11	J 15

B3

Trouble-shooting
Porsche 944

**B4**

Trouble-shooting
Porsche 944



8.2 Pin-pointed, direct trouble-shooting

8.2.1 Test with Motronic test adapter

The test with the test adapter must come at the start of the test program and must be performed from beginning to end.

8.2.2 Trouble-shooting according to customer complaints

The table below contains various fault symptoms with several possible causes of the fault in each case. The references given on the left indicate the first coordinate of the test step for the respective individual component of the Motronic. If, after testing the individual components, the fault has not been located or remedied, it is necessary to choose a new fault symptom.

Customer complaint (fault symptoms)

1. Engine fails to start or starts only with great difficulty
2. Engine starts but then dies
3. Uneven engine idle, idle speed incorrect
4. Poor throttle take-up
5. Engine missing under all operating conditions
6. Fuel consumption too high
7. No maximum engine power
8. CO concentration at idle too high or too low

Cause (component fault)

B11	B11	B11	B11	B11	B11	B11	B11	Test with Motronic test adapter
*)								Relay combination (main and pump relay) defective
*)								Electric fuel pump not operating
F22	G 9		H 7					Auxiliary-air device not opening
		G19						Auxiliary-air device not closing
G 1	G11	G15	H 5	H17	J 1	J 9	J17	Air-flow sensor defective

Continued on B7/B8/B9/B10

B5

Trouble-shooting
Porsche 944



B6

Trouble-shooting
Porsche 944



Customer complaints (fault symptoms)

1. Engine fails to start or starts only with great difficulty
 2. Engine starts but then dies
 3. Uneven engine idle, idle speed incorrect
 4. Poor throttle take-up
 5. Engine missing under all operating conditions
 6. Fuel consumption too high
 7. No maximum engine power
 8. CO concentration at idle too high or too low

Cause (component fault)

G 1	G 7	G17	H 5				J19	Air-intake system leaking
F18		G21						Solenoid-operated injection valves defective
●*)		●*)				J 7		Fuel pressure too low or zero; pressure regulator not operating
		●*)			●*)		●*)	Fuel pressure too high; pressure regulator not operating
				H15		J11		Fuel delivery too low
	●*)				●*)		●*)	Temperature sensor I (air) or temperature sensor II (coolant) defective
						J 5		Throttle valve not opening fully
				H13				Poor central ground, loose contacts, faulty plug-in connections
G 1	G 7	G17	H 5			J13	J19	Open circuit in wiring harness and plug-in connections
		●*)				●*)		Throttle-valve switch defective
		G23					J21	CO exhaust-gas setting too rich, idle adjustment
		G23	●*)				J21	CO exhaust-gas setting too lean, idle adjustment

Continued on B9/B10

B7

Trouble-shooting
Porsche 944



B8

Trouble-shooting
Porsche 944



Customer complaints (fault symptoms)

1. Engine fails to start or starts only with great difficulty

2. Engine starts but then dies

3. Uneven engine idle, idle speed incorrect

4. Poor throttle take-up

5. Engine missing under all operating conditions

6. Fuel consumption too high

7. No maximum engine power

8. CO concentration at idle too high or too low

Cause (component fault)

0*)								Engine-speed sensor defective
0*)								Reference-mark sensor defective
				H19				Alternator, check interference-suppression devices
F18		G15	H 3	H13	H23	J 5	J17	Check secondary-circuit oscilloscope display
0*)	0*)	0*)	0*)		0*)	0*)	0*)	Control unit defective

0*) If you have performed the test with Motronic test adapter, this component has already been tested. Continue testing with the next component in this column.
However, if you have arrived at this point through a component complaint or through the test-specifications table, you must test this component with the Universal test adapter. The test program for the test adapter begins on Coordinate B11 and must be performed from beginning to end.



9. Test with Universal test adapter ETT 018.01
(0 684 101 801) and adapter cable for Motronic

Connect the Motronic test adapter to the Motronic wiring harness (ignition must be off).

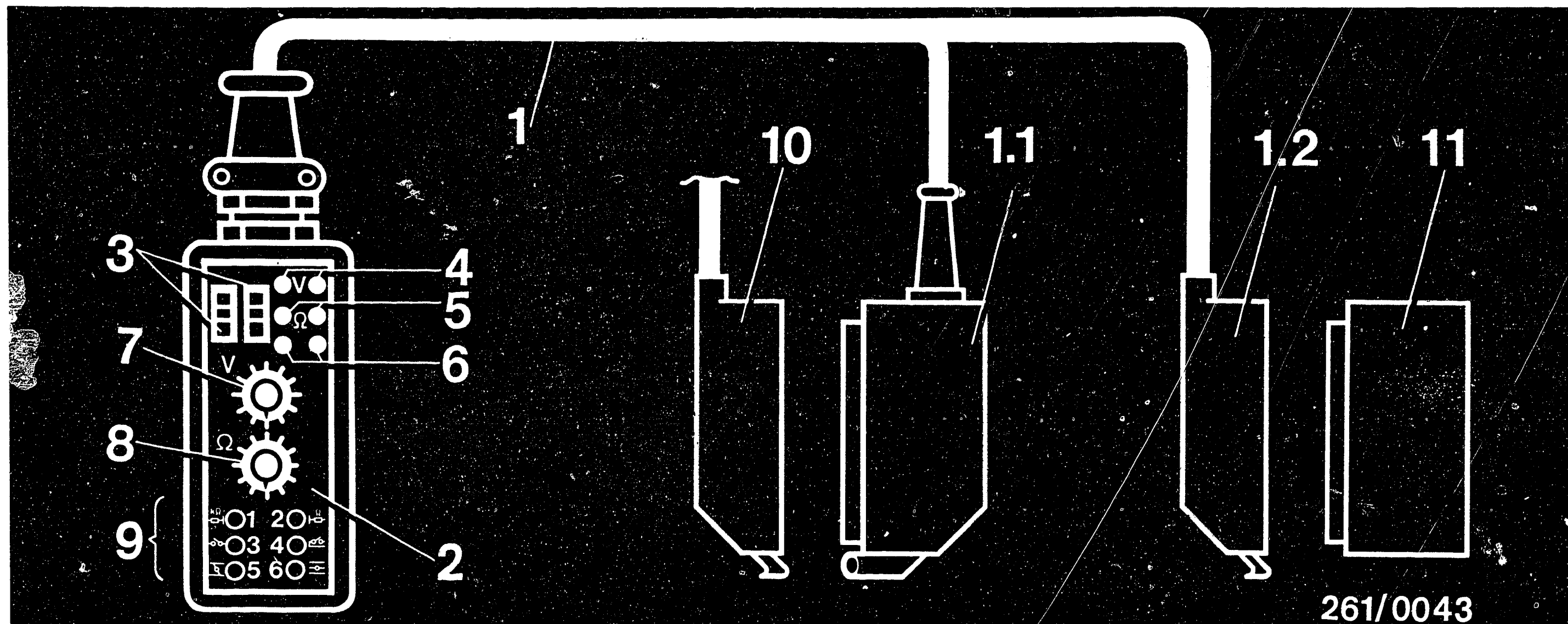
For testing the wiring harness and the connected components, only the Motronic wiring harness must be connected - but not the control unit. Be sure to observe the instructions in the test chart!

A pointer instrument for the voltage and resistance measurements (multimeter) as well as the motortester must be connected to the test adapter in order to make the measurements.

The individual test steps are selected with the program selector switch. The symbols V and Ω show the operator whether voltage or resistance is being measured. Some switch positions are necessary for simulation of operating conditions with engine running. By pressing the pushbuttons it is possible, with the control unit connected and the engine running, to simulate given operating conditions. Thus, for example, with the engine at normal operating temperature it is possible by pressing the push-button T1 to make the control unit "think" that the engine temperature is -20°C . It is then possible to evaluate the reaction of the control unit on the motor-tester.

If necessary, the circuit diagram can be used for trouble-shooting.





Universal test adapter with adapter lead for Motronic

- 1 = Adapter lead
- 1.1 = Connection to wiring harness
- 1.2 = Connection to control unit
- 2 = Universal adapter (Part No.: 0 684 001 801)
- 3 = Test wells (for motortester)
- 4 = Test sockets (for voltage measurement)
- 5 = Test sockets (for resistance measurement)
- 6 = Test sockets (not occupied)
- 7 = Program switch "V"
- 8 = Program switch "Ω"

- 9 = Button panel for simulation of operating conditions
- 10 = Motronic wiring harness
- 11 = Control unit
- Button 1 = NTC II (engine), cold (-20° C)
- Button 2 = NTC II (engine), warm (+80° C)
- Button 3 = Pump energization
- Button 4 = Not occupied
- Button 5 = Throttle-valve idle contact
- Button 6 = Throttle-valve full-load contact

B 12

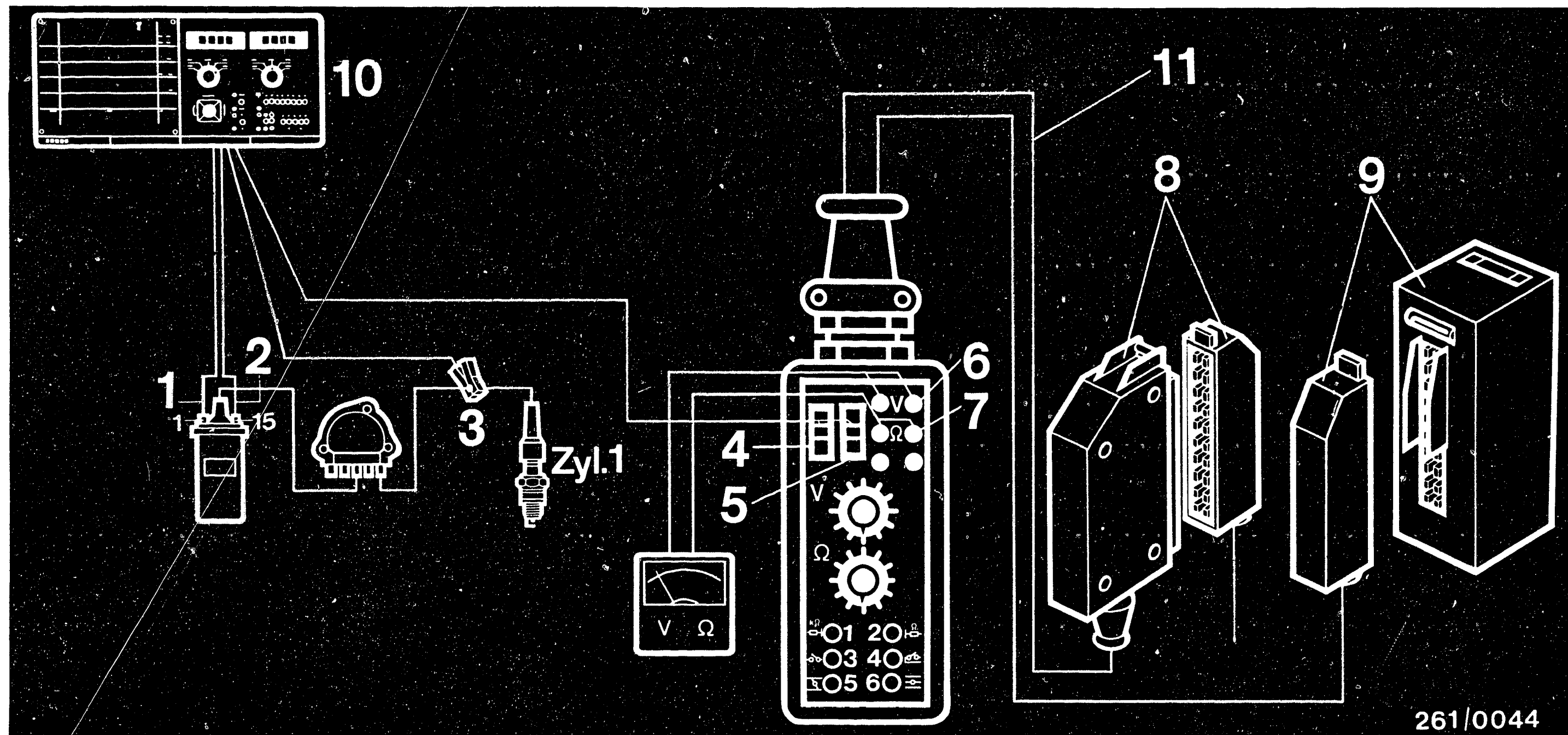
Test with Universal test adapter
Porsche 944



B 13

Test with Universal test adapter
Porsche 944





261/0044

9.3 Connection diagram for test adapter

- | | |
|--|--|
| 1 = Green clip to ignition coil term. 1 | 6 = Connection of voltmeter to V sockets (red = +, black = ground or negative) |
| 2 = Yellow clip to ignition coil term. 15 | 7 = Connection of ohmmeter to black sockets (blue) |
| 3 = Induction-type clamp-on pickup over H.T. ignition cable of cylinder 1 | 8 = Connection to Motronic wiring harness |
| 4 = Red connection socket (test well) for red terminal of motortester | 9 = Connection to Motronic control unit |
| 5 = Black connection socket (test well) for black terminal of motor tester | 10 = Motortester |
| | 11 = Adapter cable for Motronic |

B 14

Test with test adapter

Porsche 944



B 15

Test with test adapter

Porsche 944



Preparations for test with Universal test adapter

Remove the control unit and connect the test adapter.

Installation position of the control unit: Under the instrument panelling in front of the steering column.

To remove the control unit, force back the detent and hinge up and remove the plug in the direction of the arrow.

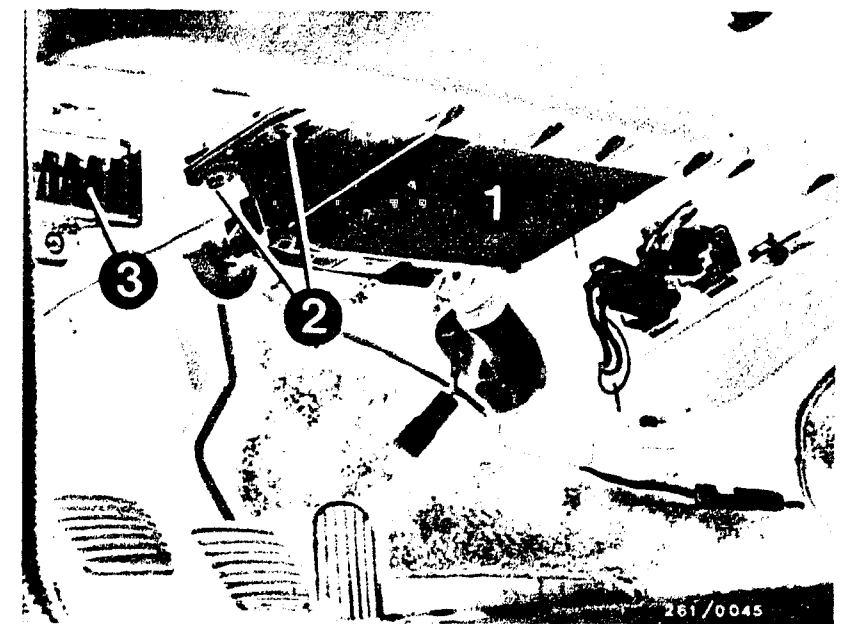
The control unit is secured by 4 screws.

Note

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

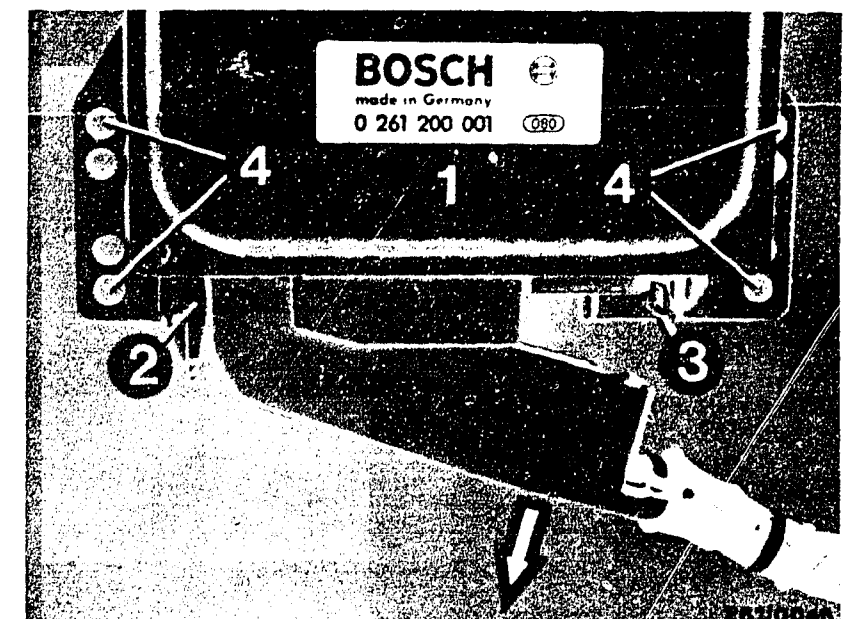
Note:

In the following test steps, the column "operation" has a white border to show which operation has to be changed compared with the previous operation.



- 1 = Control unit
- 2 = Fastening screws
- 3 = Fuse box

- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Fastening holes



B 16

Test with test adapter
Porsche 944




B 17

Test with test adapter
Porsche 944



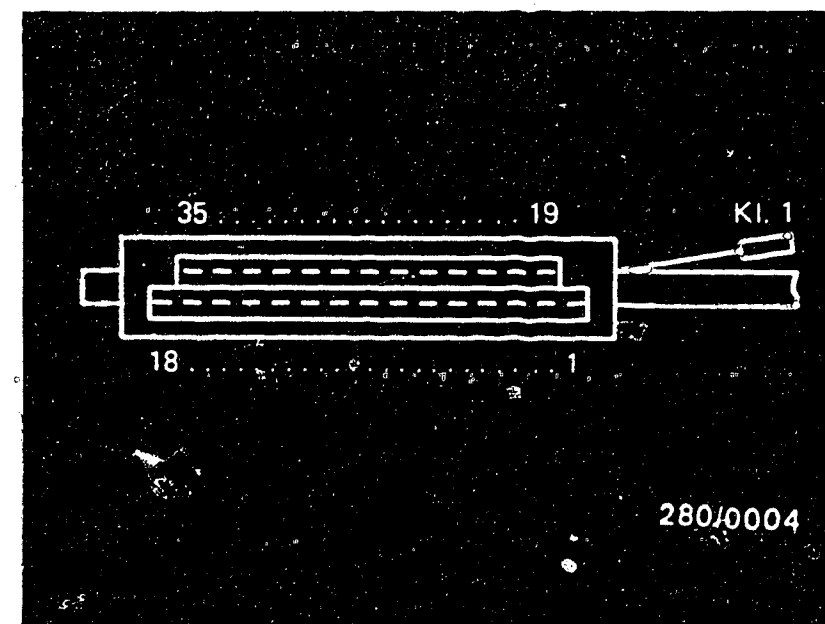
Test step 1: Switch off ignition. Disconnect control unit.

Operation		Reading	Testing
<u>Program switch position</u> "V"		greater than 1 M Ω	<u>Component:</u> Engine-speed sensor
<u>Program switch position</u> "Ω"	1		
<u>Measuring equipment:</u> Ohmmeter			<u>Operation:</u>
<u>Measuring range:</u> 10 M Ω			Insulation between Term. 8 and ground
<u>Connection:</u> Test sockets	Ω		<u>Malfunction:</u>
<u>Operation in vehicle:</u> Switch off ignition.			Resistance less than 1 M Ω

Trouble-shooting:

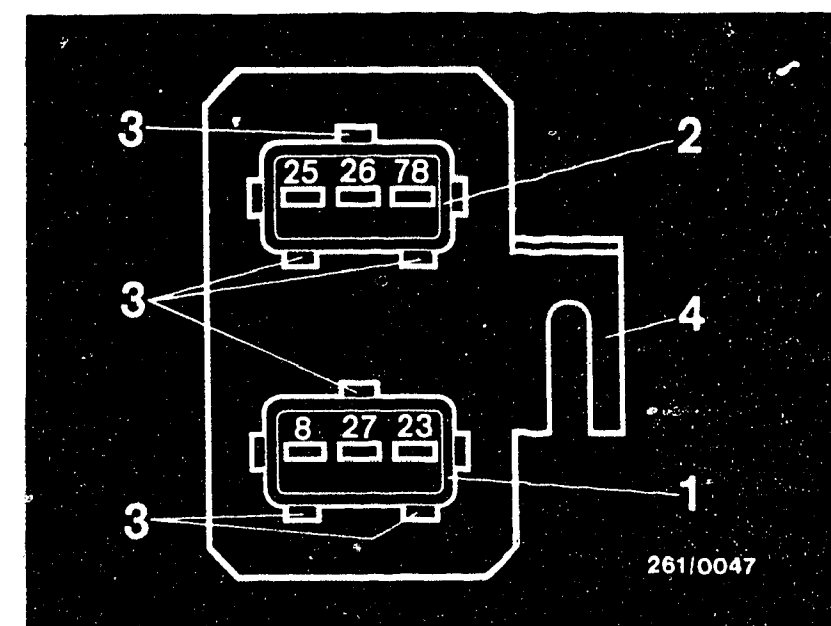
Resistance reading approx. 0 Ω :
Check Lead 8 for short circuit to ground.

Resistance reading 0.6...1.6 k Ω :
Check Lead 27 for short circuit to ground.



Top view of 35-pin multiple plug of Motronic wiring harness
Kl. 1 (Term. 1) = Plug-in connection to tachometer

- 1 = Connector for engine-speed sensor (marked DG)
- 2 = Connector for reference mark sensor (marked BG)
- 3 = Locating lugs
- 4 = Holding plate



B 18

Test with universal test adapter
Porsche 944



B 19

Test with universal test adapter
Porsche 944

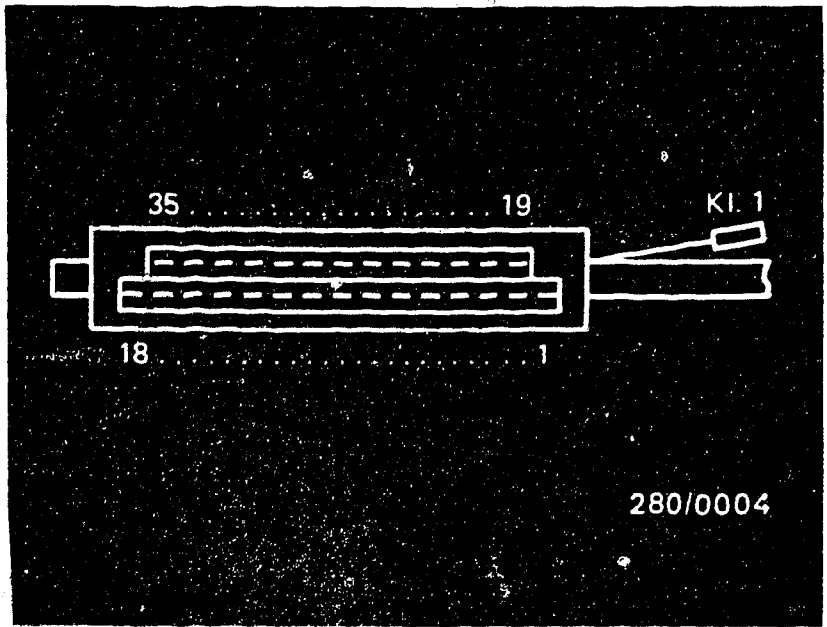


Test step 2		
Operation		Reading
Program switch position "V"	<div>↓</div> <div>2</div>	Greater than 1 M Ω
Program switch position "Ω"		
Measuring equipment: Ohmmeter		
Measuring range: 10 M Ω		
Connection: Test sockets Ω		
Operation in vehicle: Switch off ignition.		
		Component: Reference-mark sensor Operation: Insulation between Term. 25 and ground Malfunction: Resistance less than 1 M Ω

Trouble-shooting:

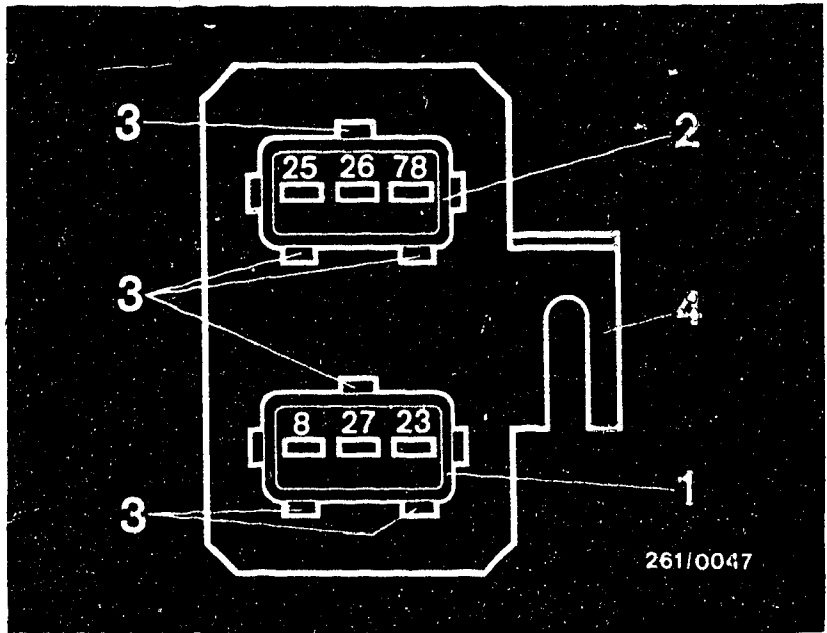
Resistance reading approx. 0 Ω :
Check lead 25 for short circuit to ground.

Resistance reading 0.6...1.6 k Ω :
Check lead 26 for short circuit to ground.

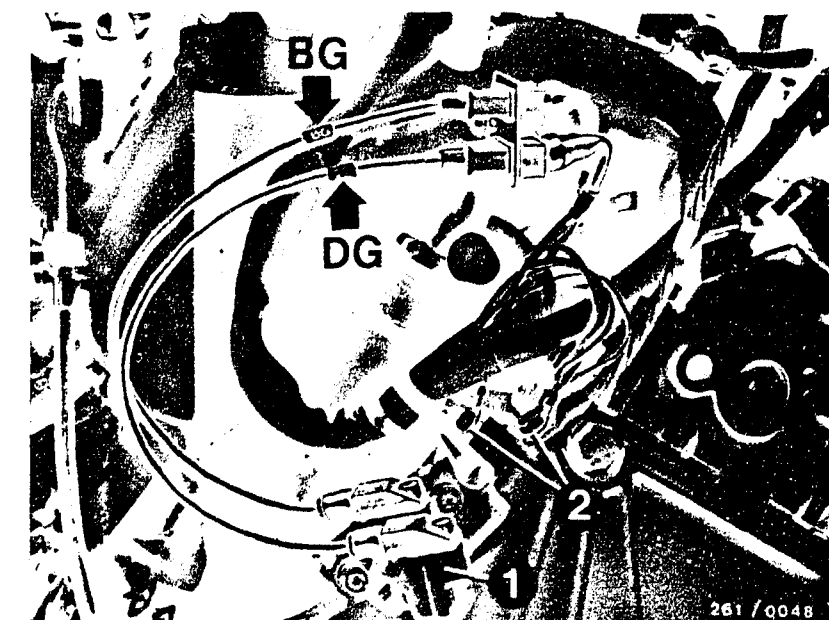


Top view of 35-pin multiple plug of Motronic wiring harness
 KI. 1 (Term. 1) = Plug-in connection to tachometer

1 = Connector for engine-speed sensor
 2 = Connector for reference-mark sensor (marked)
 3 = Locating lugs
 4 = Holding plate



Test step 3			
Operation		Reading	Testing
Program switch position "V"	↓	0.6...1.6 kΩ If reading O.K., continue testing with test step 4.	<u>Component:</u> Engine-speed sensor
Program switch position "Ω"	3		<u>Operation:</u> Winding resistance between Term. 8 and Term. 27
Measuring equipment: Ohmmeter			<u>Malfunction:</u> Resistance outside tolerance
Measuring range: 0 to 10 kΩ			
Connection: Test sockets	Ω		
Operation in vehicle: Switch off ignition			



BG = Reference-mark sensor
 DG = Engine-speed sensor
 1 = Mounting
 2 = Ground terminals for
 Motronic

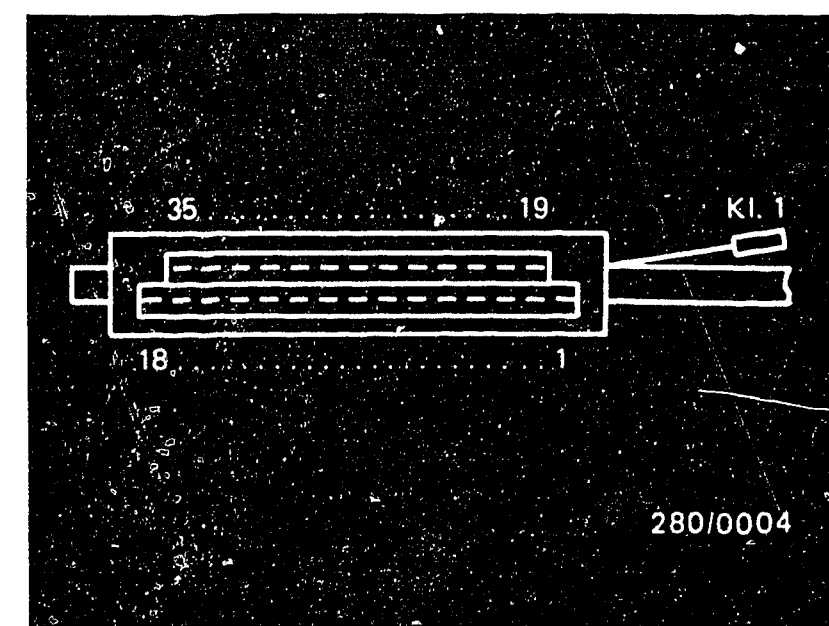
Top view of 35-pin multiple
 plug of Motronic wiring
 harness
 Kl. 1 (Term. 1) = Plug-in
 connection to tachometer

Trouble-shooting:

- Repeat measurement directly at sensor plug.
- Check plug-in connection: Corrosion, loose contact (spring contacts must not allow themselves to be pushed back)
- Check leads from engine-speed sensor Term. 8 and Term. 27 to multiple plug Term. 8 and Term. 27.
- Replace sensor.

To replace the sensors, undo the plug-in connection and unscrew the hexagon-socket-head cap screw on the sensor. Remove dirt deposits on the sensor. If necessary, apply two screw-drivers to the recesses to left and right of the sensor and raise the sensor. Caution! Do not loosen the mounting.

Continued on C1/C2



B22

Test with universal test adapter
 Porsche 944

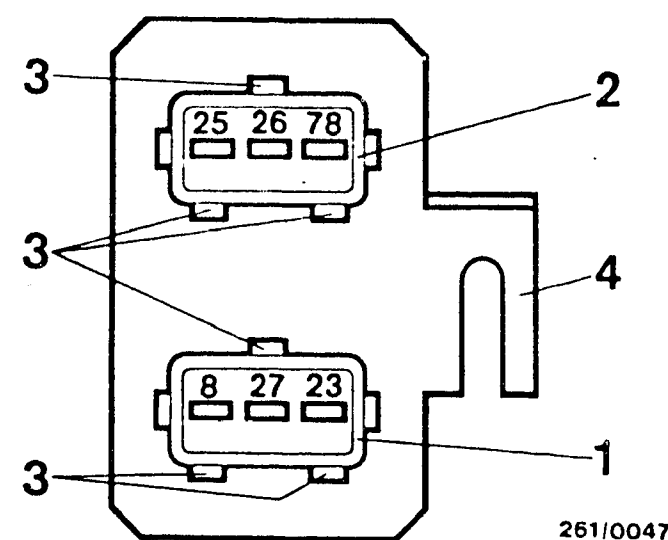


B23

Test with universal test adapter
 Porsche 944



Trouble-shooting - Test step 3 (continued)



Top view of sensor connectors

- 1 = Connector of engine-speed sensor (marked DG)
- 2 = Connector of reference-mark sensor (marked BG)
- 3 = Locating lugs
- 4 = Holding plate for sensor connectors
- 78, 25, 26, 23, 8, 27 = Terminal numbers

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets). Grease sensors with Molykote Longterm 2.

Do not mix up the sensors when installing!

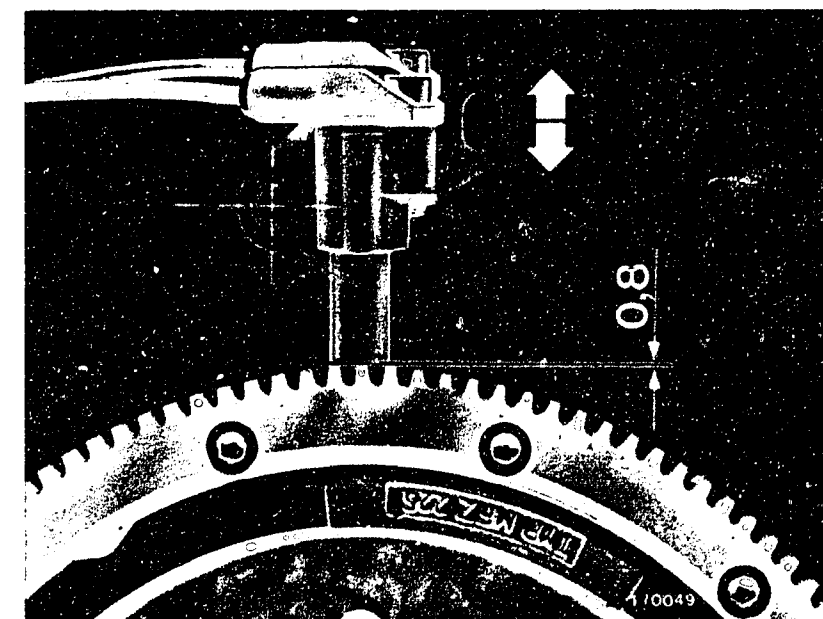
Pay attention to markings:

- Reference-mark sensor marked BG (B on mounting).
- Engine-speed sensor marked DG (D on mounting).

The sensors are plugged into the holes as far as they will go and are secured. Do not use force when inserting.

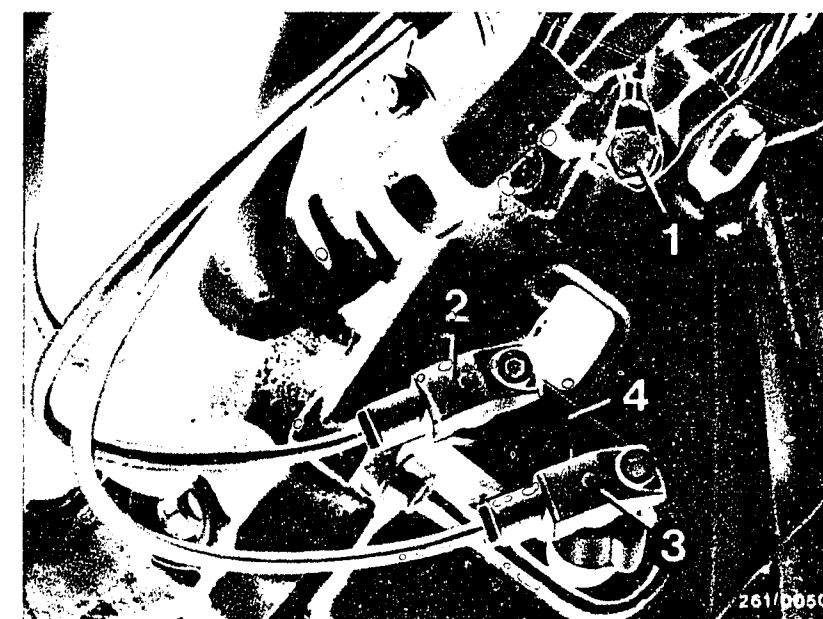
When installing, make sure that the connectors are not mixed up. Make sure that the spring contacts in the plug are seated properly and that they latch in position.

Spring contacts must not allow themselves to be pushed back.



BG = Reference-mark sensor
DG = Engine-speed sensor
1 = Mounting

- 1 = Ground terminals for Motronic
- 2 = Reference-mark sensor (B)
- 3 = Engine-speed sensor (D)
- 4 = Mounting



C1

Test with universal test adapter
Porsche 944



C2

Test with universal test adapter
Porsche 944



Test step 4			
Operation		Reading	Testing
Program switch position "V"	↓	<p>0.6...1.6 kΩ</p> <p>If reading O.K., continue testing with test step 5.</p>	Component:
Program switch position " Ω "	4		Reference-mark sensor
Measuring equipment:			Operation:
Ohmmeter			Winding resistance between Term. 25 and Term. 26
Measuring range:			Malfunction:
0 to 10 k Ω			Resistance outside tolerance.
Connection:			
Test sockets	Ω		
Operation in vehicle:			
Switch off ignition			

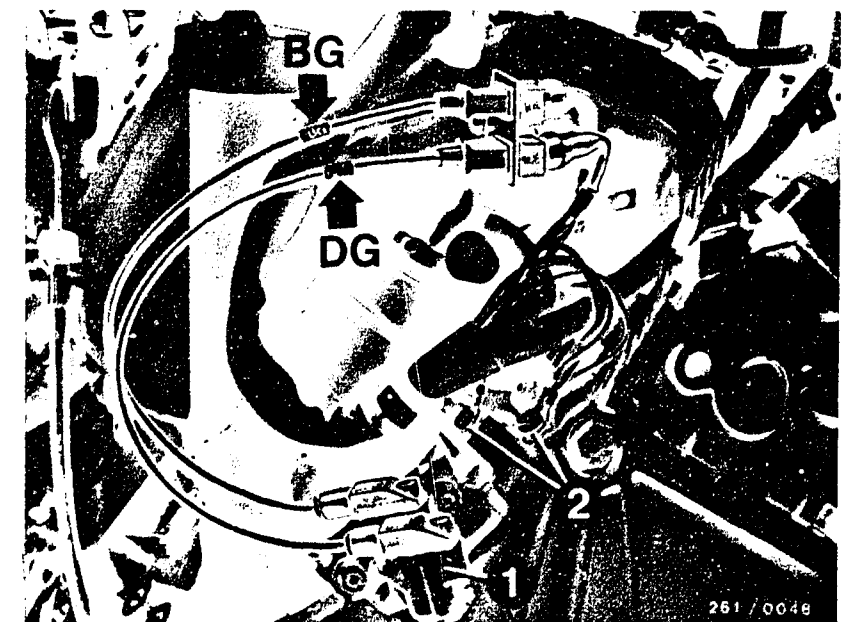
Trouble-shooting:

- Repeat measurement directly at sensor plug.
- Check plug-in connection for corrosion, loose contact (spring contacts must not allow themselves to be pushed back)
- Check leads from reference-mark sensor Term. 25 and Term. 26 to multiple plug Term. 25 and Term. 26.
- Replace sensor.

To replace the sensors, unscrew the hexagon-socket-head cap screw on the sensor. Remove dirt deposits from sensor. If necessary, apply two screwdrivers to the recesses to left and right of the sensor and raise sensor.

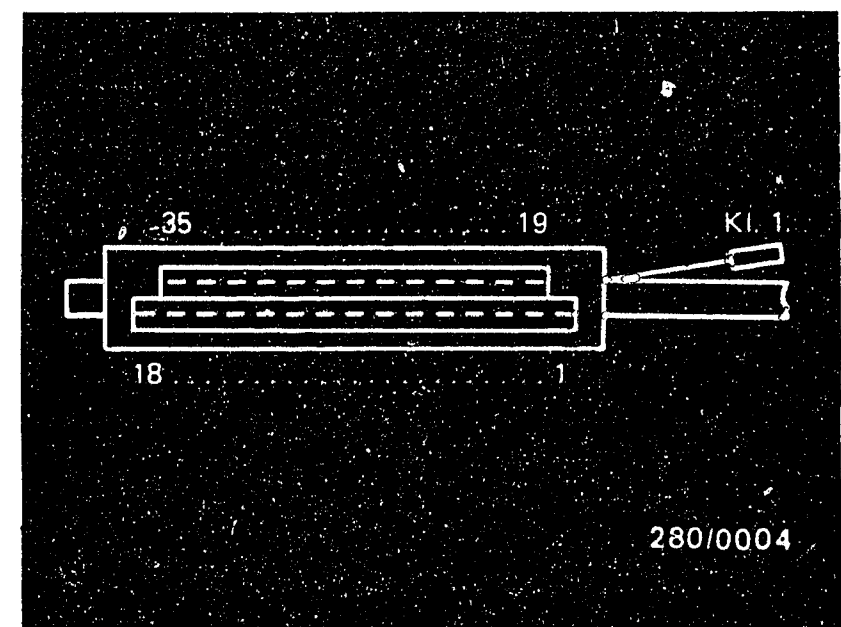
Caution! Do not loosen mounting.

Continued on C5/C6



BG = Reference-mark sensor
 DG = Engine speed sensor
 1 = Mounting
 2 = Ground terminals for Motronic

Top view of 35-pin multiple plug of Motronic wiring harness
 Kl. 1 (Term. 1) = Plug-in connection to tachometer



280/0004

C3

Test with universal test adapter
 Porsche 944

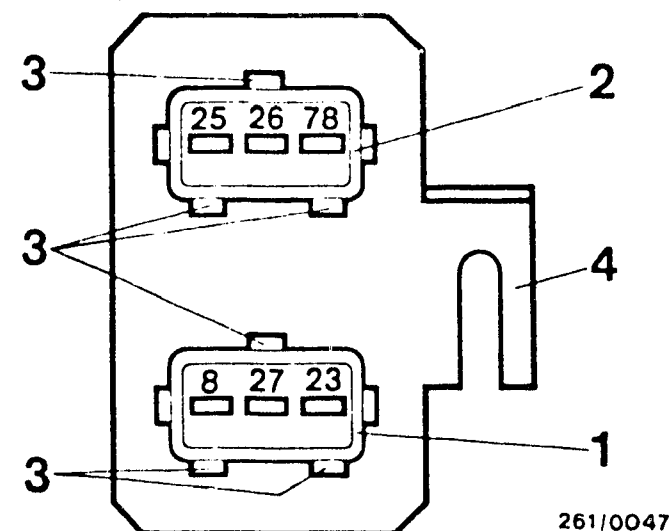


C4

Test with universal test adapter
 Porsche 944



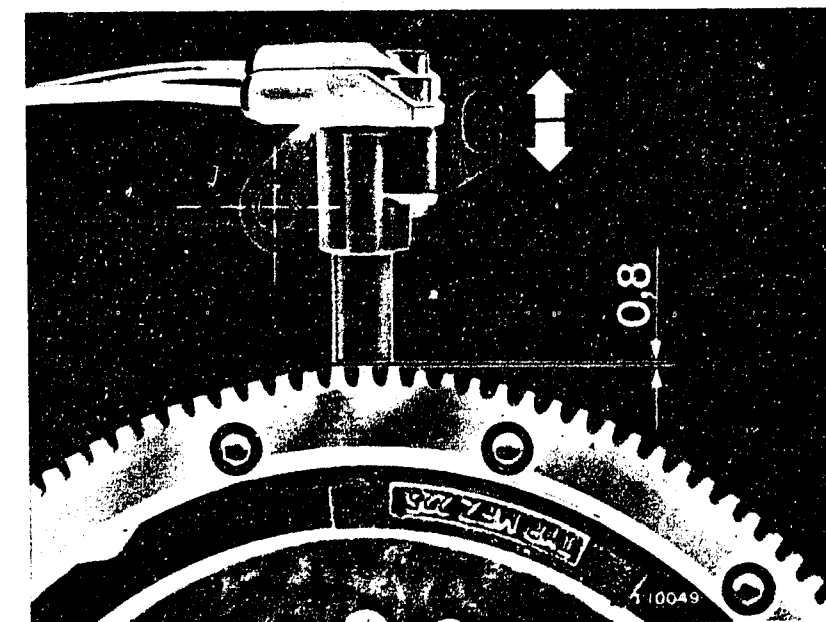
Trouble-shooting - Test step 4 (continued)



Top view of sensor connectors

- 1 = Connector of engine-speed sensor (marked DG)
- 2 = Connector of reference-mark sensor (marked BG)
- 3 = Locating lugs
- 4 = Holding plate for sensor connectors
- 78, 25, 26, 23, 8, 27 = Terminal numbers

Continued on C7/C8



- BG = Reference-mark sensor
- DG = Engine-speed sensor
- 1 = Mounting

C5

Test with universal test adapter
Porsche 944



C6

Test with universal test adapter
Porsche 944



Trouble-shooting - Test step 4 (continued)

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets). Grease sensors with Molykote Longterm 2.

Do not mix up the sensors when installing!

Pay attention to markings:

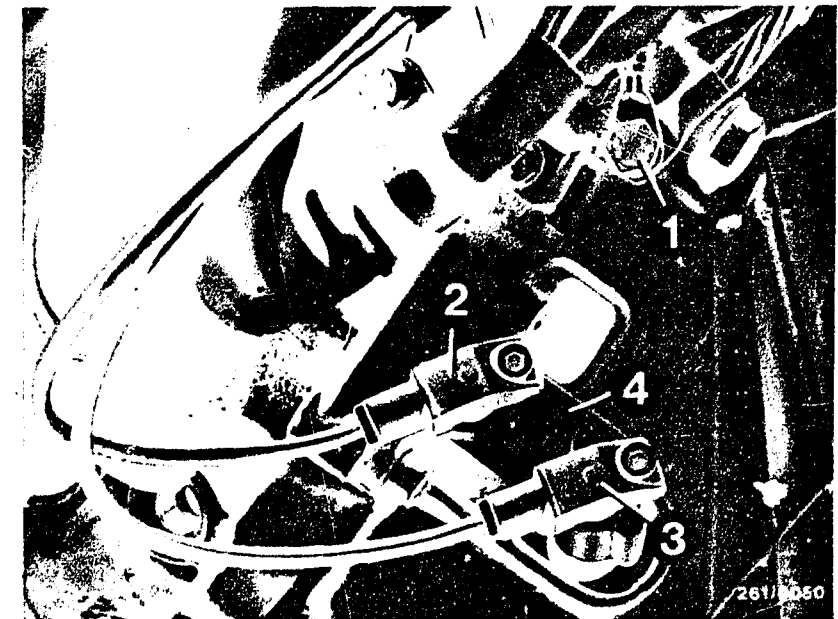
- Reference-mark sensor marked BM.
- Engine-speed sensor marked DG.

The sensors are plugged into the holes as far as they will go and are secured. Do not use force when inserting.

When installing, make sure that the connectors are not mixed up.

Make sure that the spring contacts in the plug are seated properly and that they latch in position.

Spring contacts must not allow themselves to be pushed back.



- 1 = Ground terminals for Motronic
- 2 = Reference-mark sensor (B)
- 3 = Engine-speed sensor (D)
- 4 = Mounting

C7

Test with universal test adapter
Porsche 944

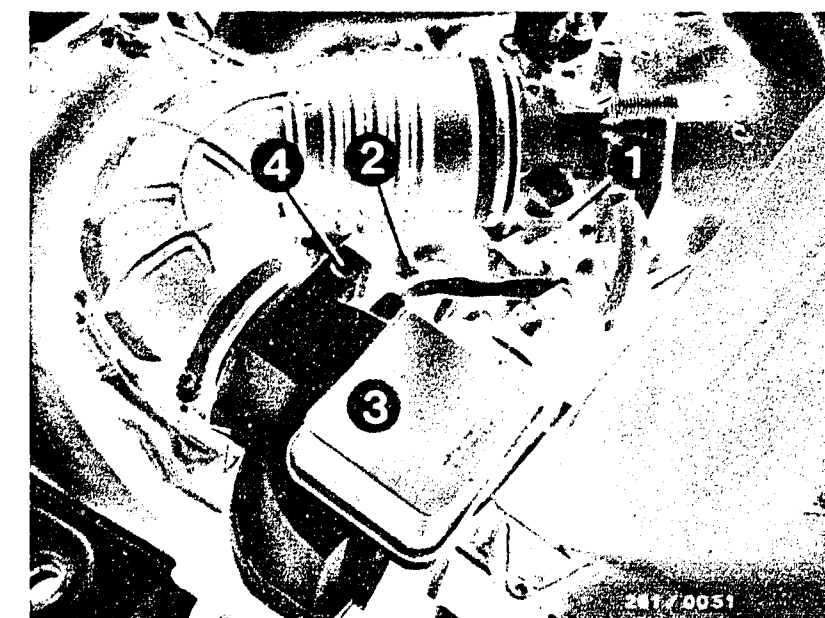


C8

Test with universal test adapter
Porsche 944



Test step 5			
Operation		Reading	Testing
Program switch position "V"	↓	Reading is temperature -dependent, i.e. note engine temperature. At ambient temper- ature (+15°...+30°C): 1.45...3.3 kΩ With engine at normal operating temperature (approx. + 80° C): 280...360Ω	<u>Component:</u> Engine temperature sensor (NTC II)
Program switch position "Ω"	5		<u>Operation:</u> Resistance between Term. 13 and ground
Measuring equipment: Ohmmeter			<u>Malfunction:</u> Resistance outside tolerance. Note temperature.
Measuring range: 0 to 10 kΩ			
Connection: Test sockets	Ω		
Operation in vehicle: Switch off ignition			



- 1 = Throttle-valve switch
- 2 = Engine temperature sensor (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Idle-mixture-adjusting screw

Trouble-shooting:

- Remove plug from temperature sensor and measure resistance directly. If necessary, replace temperature sensor.
- Check leads from temperature sensor to multiple plug Term. 13 and to ground terminal.
- Eliminate contact resistances at the plug-in connections.
Spring contacts must not allow themselves to be pushed back.

C9

Test with universal test adapter
Porsche 944



C10

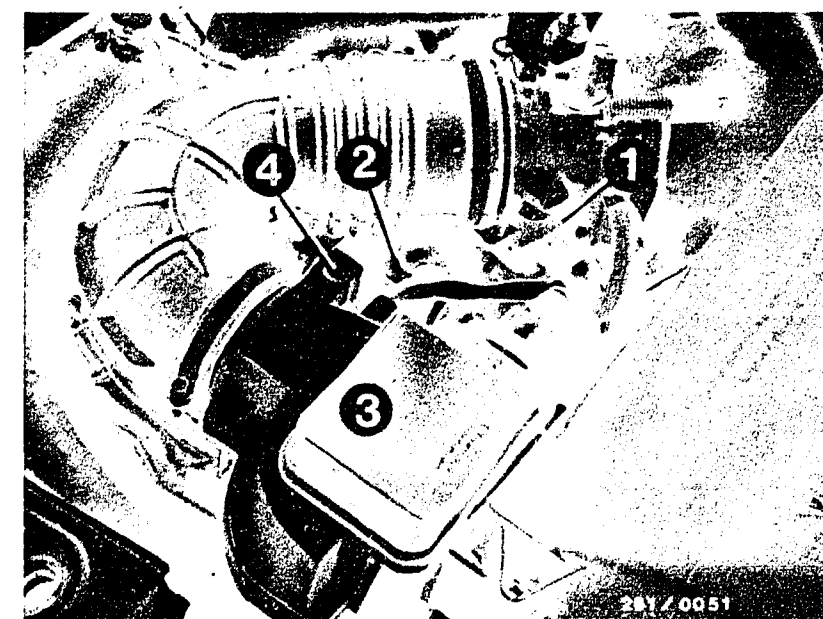
Test with universal test adapter
Porsche 944



Test step 6			
Operation		Reading	Testing
<u>Program switch position</u> "V"	↓	Reading is temperature -dependent, i.e. note engine temperature. At ambient temper- ature (+15°...+30° C): 1.45...3.3 kΩ	<u>Component:</u> Air temperature sensor (NTC I)
<u>Program switch position</u> "Ω"	6		
<u>Measuring equipment:</u> Ohmmeter		With engine at normal operating temperature (approx. + 80° C): 280...360Ω	<u>Operation:</u> Resistance between Term. 22 and ground
<u>Measuring range:</u> 0 to 10 kΩ			
<u>Connection:</u> Test sockets	Ω		
<u>Operation in vehicle:</u> Switch off ignition			<u>Malfunction:</u> Resistance outside tolerance. Note temperature.

Trouble-shooting:

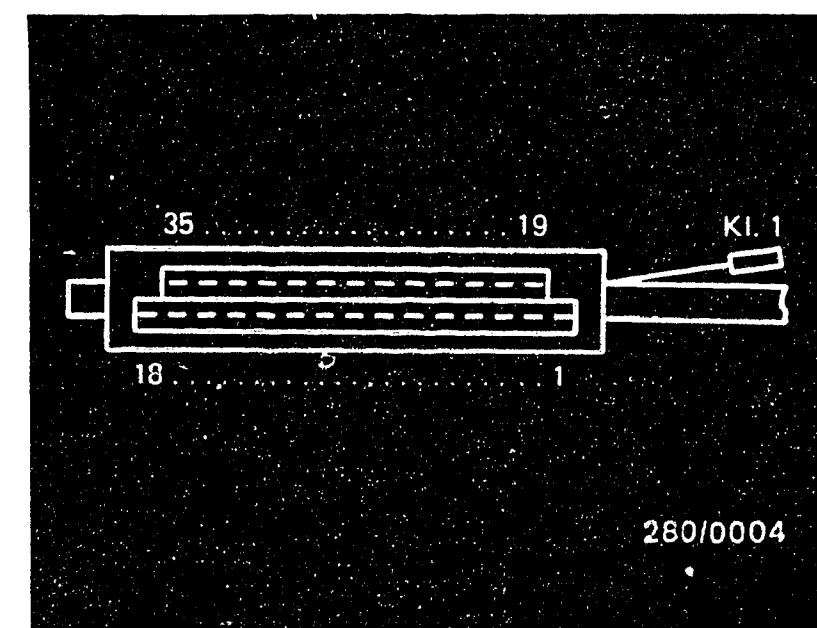
- Remove plug from air-flow sensor and measure resistance directly at Term. 22 and Term. 6. If reading outside tolerance, replace air-flow sensor.
- Check leads from air-flow sensor Term. 6 and Term. 22 to multiple plug Term. 6 and Term. 22
- Eliminate contact resistances in the plug-in connections.
Spring contacts must not allow themselves to be pushed back.



- 1 = Throttle-valve switch
 2 = Engine temperature sensor (NTC II)
 3 = Air-flow sensor with NTC I
 4 = Idle-mixture-adjusting screw

Top view of 35-pin multiple plug of Motronic wiring harness

Kl. 1 (Term. 1) = Plug-in connection to tachometer



C11



Test with universal test adapter
Porsche 944



C12

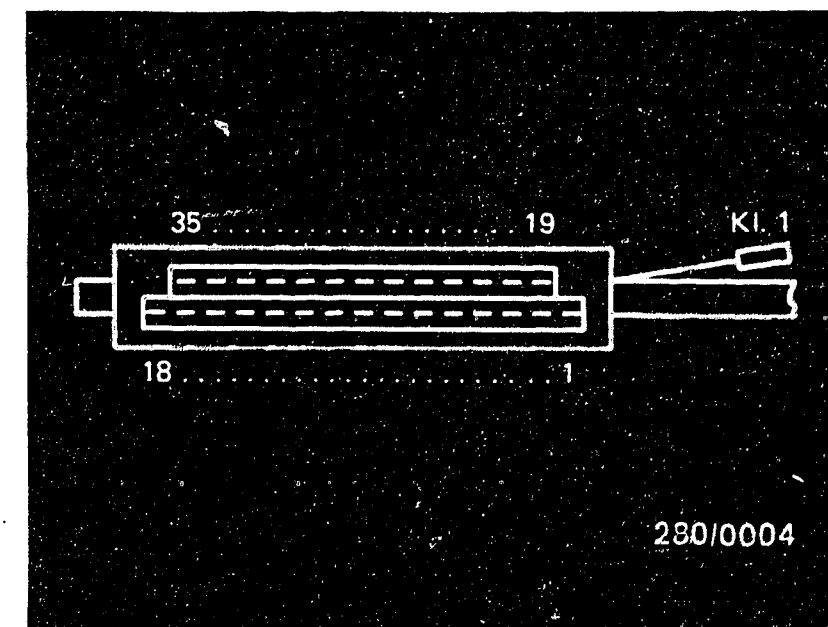
Test with universal test adapter
Porsche 944



Test step 7			
Operation		Reading	Testing
Program switch position "V"		$\infty \Omega$	Component: Lead
Program switch position "II" 	7		
Measuring equipment: Ohmmeter			Operation: No connection between Term. 10 and ground
Measuring range: 0 to 10 k Ω			
Connection: Test sockets	Ω		Malfunction: Resistance less than $\infty \Omega$
Operation in vehicle: Switch off ignition			

Trouble-shooting:

- Cut connection between multiple plug Term. 10 and ground.



Top view of 35-pin
multiple plug of Motronic
wiring harness

KI. 1 (Term. 1) = Plug-
in connection to
tachometer

C13

Test with universal test adapter
Porsche 944



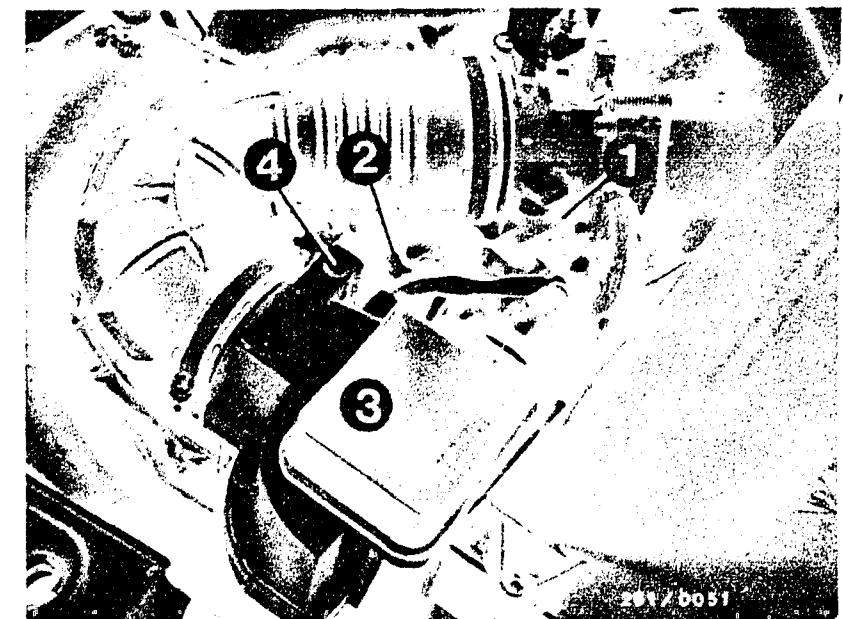
C14

Test with universal test adapter
Porsche 944



Test step 8 deleted

Test step 9			
Operation		Reading	Testing
Program switch position "V"	↓	Accelerator in rest position: Less than 15Ω	Component: Throttle-valve switch
Program switch position "Ω"	9	(Measured value is influenced by protective resistor in adapter).	Operation:
Measuring equipment: Ohmmeter		Accelerator depressed (Part-load range): ∞Ω ¹⁾	Idle contact between terminal 2 and ground
Measuring range: 0 to 10 kΩ			Malfunction:
Connection: Test sockets	Ω	If reading O.K., continue testing with test step 10.	Resistance in rest position greater than 15Ω or less than ∞Ω.
Operation in vehicle: Switch off ignition			



- 1 = Throttle-valve switch
- 2 = Engine temperature sensor (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Idle-mixture-adjusting screw

Trouble-shooting:

1) Adjusting the throttle-valve switch:

Loosen the fastening screws. Turn the operating lever to full throttle and slowly return to the idle stop.
Turn the switch in a clockwise direction until the inner stop can be felt. Tighten screws.



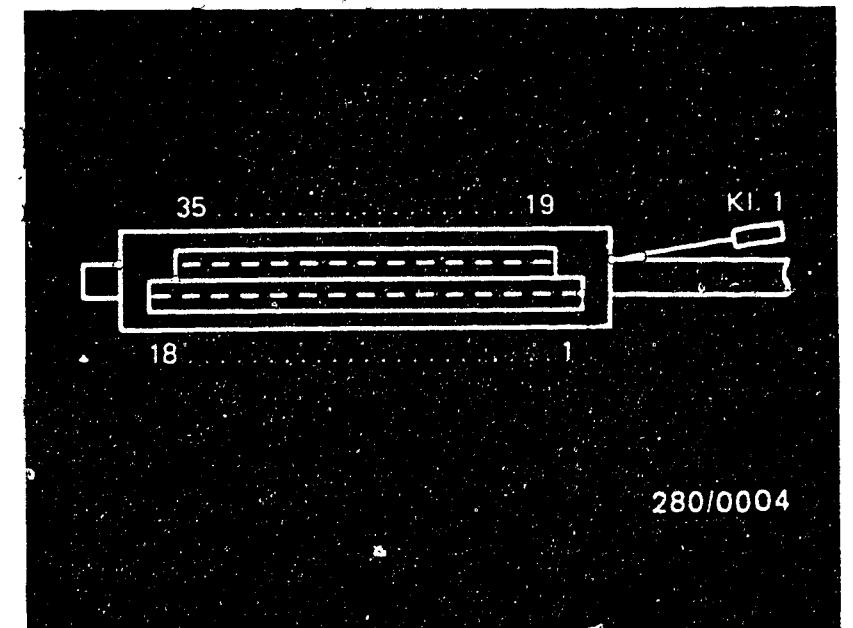
Trouble-shooting - throttle-valve switch (continued)

Check: Slowly open throttle in full-load direction. Reading must change to ∞ shortly after the throttle is opened.

If no adjustment is possible:

Check Bosch throttle-valve switch as well as leads from throttle-valve switch Term. 2 and Term. 43 to multiple plug Term. 2 and to ground terminal. Eliminate contact resistances.

Spring contacts must not allow themselves to be pushed back.



Top view of 35-pin
multiple plug of Motronic
wiring harness
Kl. 1 (Term. 1) = Plug-
in connection to tachometer

C17


Test with universal test adapter
Porsche 944



C18

Test with universal test adapter
Porsche 944



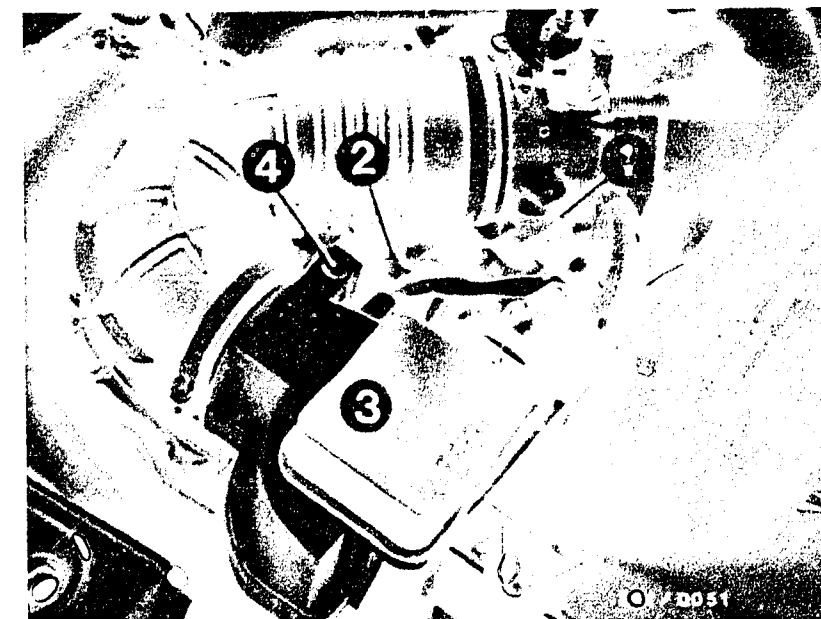
Test step 10			
Operation		Reading	Testing
Program switch position "V"		Accelerator in part-load position: $\infty \Omega$	Component: Throttle-valve switch
Program switch position "Ω"	10	Accelerator at full-load stop: Less than $15\Omega^{1)}$	Operation: Full-load contact between terminal 3 and ground
Measuring equipment: Ohmmeter		(Measured value is influenced by protective resistor in adapter)	Malfunction: Resistance at full load greater than 15Ω or $\infty \Omega$.
Measuring range: 0 to 10 kΩ			
Connection: Test sockets	Ω		
Operation in vehicle: Switch off ignition			

Trouble-shooting:

¹⁾ Check: Move the throttle valve in the full-load direction. Reading changes to less than 15Ω (full-load contact closed) shortly before the full-load stop of the operating lever.

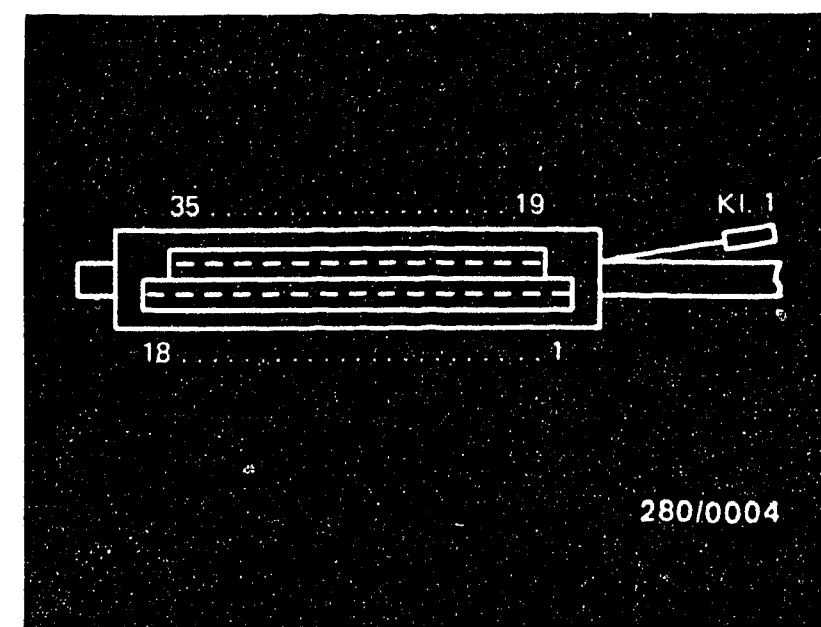
Reading greater than 15Ω or $\infty \Omega$:

Check whether the throttle valve is opening fully. Check the throttle linkage/Bowden cable from the accelerator to the throttle valve.
Check Bosch throttle-valve switch as well as lead from throttle-valve switch Term. 3 to multiple plug Term. 3.
Eliminate contact resistances.
Spring contacts must not allow themselves to be pushed back.



- 1 = Throttle-valve switch
- 2 = Engine temperature sensor (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Idle-mixture-adjusting screw

Top view of 35-pin multiple plug of Motronic wiring harness Kl. 1 (Term. 1) = Plug-in connection to tachometer



280/0004

C19

Test with universal test adapter
Porsche 944



C20

Test with universal test adapter
Porsche 944



Trouble-shooting - Test step 16 (continued)

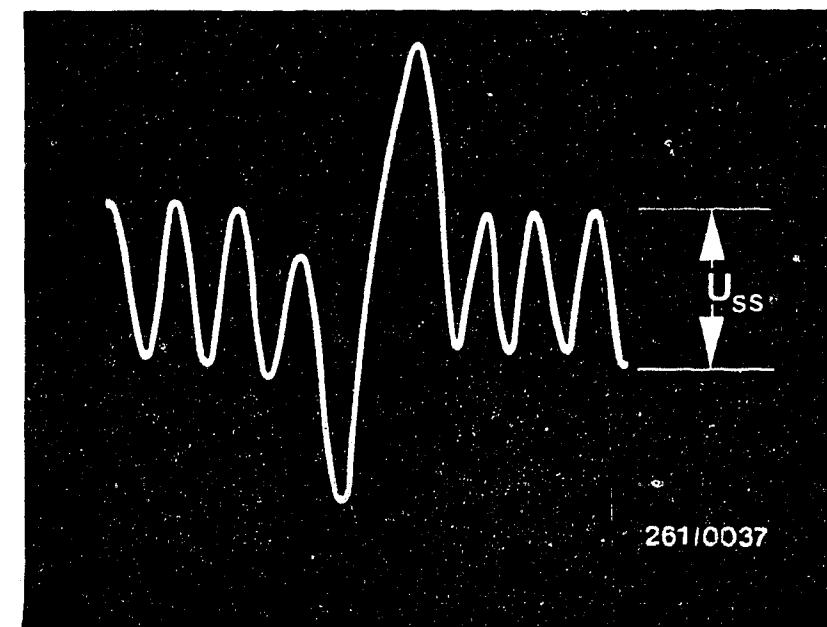
Test the air gap with the engine installed as follows:

With the engine-speed sensor removed, measure the length of the sensor using a depth gauge. Make a note of the measurement. Using depth gauge, measure depth of hole in mounting as far as tip of gear tooth. Do not measure into space between teeth. The difference between both dimensions (depth of hole minus length of sensor) must be between 0 and 0.8 mm. If necessary, loosen screws on mounting and adjust air gap by turning mounting.

- Incorrect signal (greatly extended in the picture):
Heavily damaged tooth on starting motor ring gear. Replace ring gear.
- Replacing the engine-speed sensor:
Unscrew hexagon-socket-head cap screw on sensor. Remove dirt deposits on sensor. If necessary, apply two screwdrivers to the recesses to left and right of the sensor and raise sensor.

Caution! Do not loosen mounting.

Continued on D11/D12



D9

Test with universal test adapter
Porsche 944



D10

Test with universal test adapter
Porsche 944



Test step 11			
Operation		Reading	Testing
Program switch position "V"	↓	Less than 15Ω (Measured value is influenced by protective resistor in adapter)	Component: Ground lead
Program switch position "Ω"	11		
Measuring equipment:			Operation: Contact resistance between Term. 16 and ground
Ohmmeter			
Measuring range:			Malfunction: Resistance greater than 15Ω
0 to 10 kΩ			
Connection:			
Test sockets	Ω		
Operation in vehicle:			
Switch off ignition			

Trouble-shooting:

For testing, remove wiring-harness plug from test adapter and, if necessary, use circuit diagram.

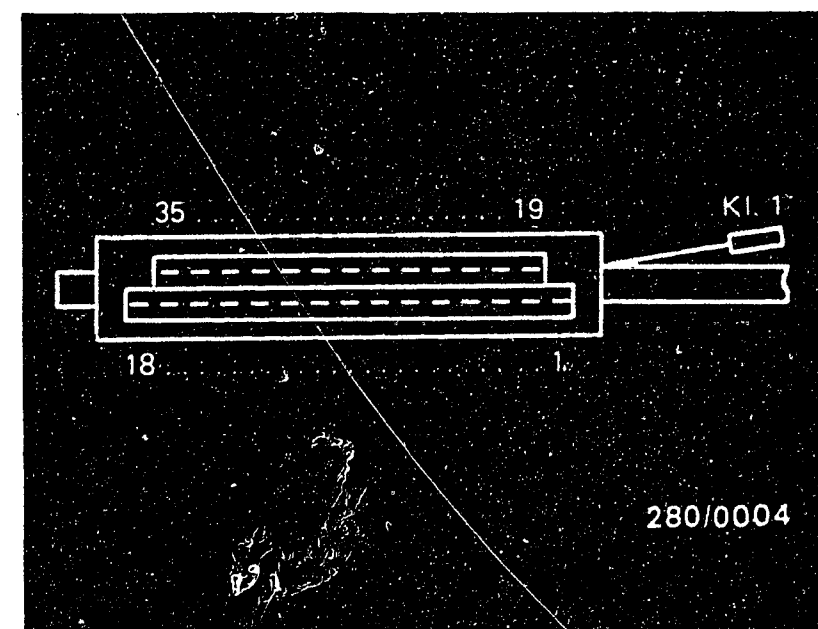
Test the following leads for continuity using ohmmeter (set value approx. 0Ω):

From multiple plug Term. 16 to output stage ground terminal.

From multiple plug Term. 5 to electronics ground terminal.

Eliminate contact resistances at connection points.

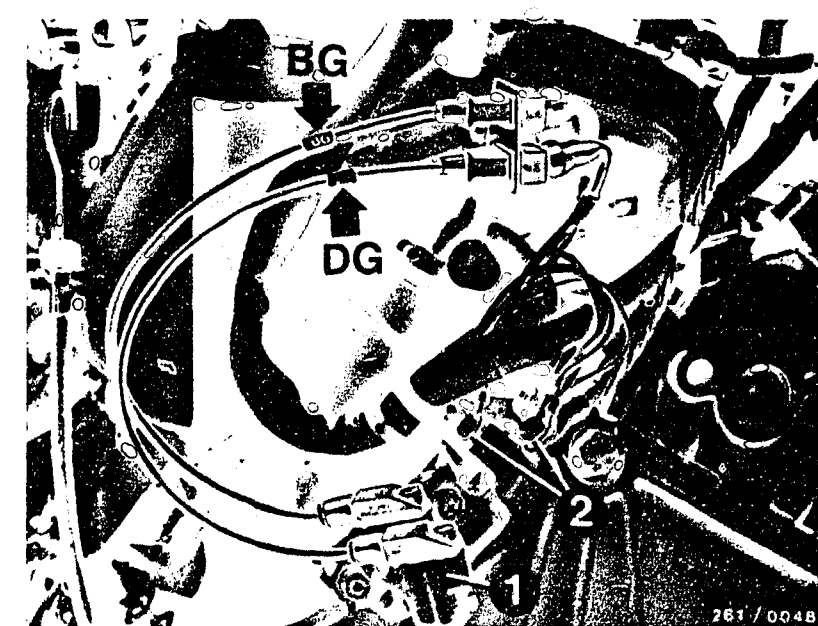
Spring contacts must not allow themselves to be pushed back.



Top view of 35-pin multiple plug of Motronic wiring harness

Kl. 1 (Term. 1) = Plug-in connection to tachometer

BG = Reference-mark sensor
 DG = Engine-speed sensor
 1 = Mounting
 2 = Ground terminals for Motronic



D1


Test with universal test adapter
Porsche 944

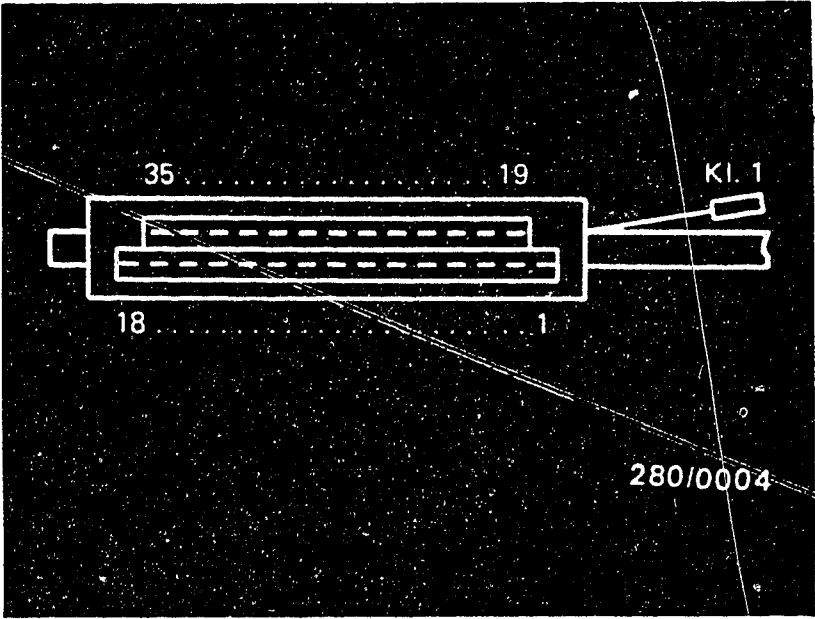


D2

Test with universal test adapter
Porsche 944

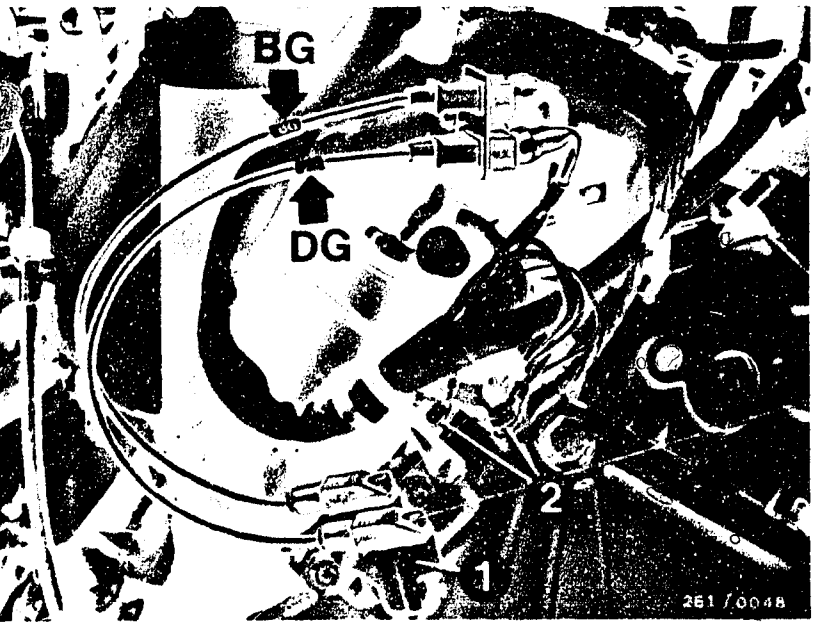


Test step 12			
Operation		Reading	Testing
Program switch position "V"		<u>Less than 15Ω</u> (Measured value is influenced by protective resistor in adapter)	<u>Component:</u> Ground lead
Program switch position "Ω"			
	12		
<u>Measuring equipment:</u> Ohmmeter			<u>Operation:</u> Contact resistance between Term. 17 and ground
<u>Measuring range:</u> 0 to 10 kΩ			
<u>Connection:</u> Test sockets	Ω		<u>Malfunction:</u> Resistance greater than 15 Ω
<u>Operation in vehicle:</u> Switch off ignition			




Top view of 35-pin multiple plug of Motronic wiring harness
Kl. 1 (Term. 1) = Plug-in connection to tachometer

- BG = Reference-mark sensor
- DG = Engine-speed sensor
- 1 = Mounting
- 2 = Ground terminals for Motronic




D3

Test with universal test adapter
Porsche 944

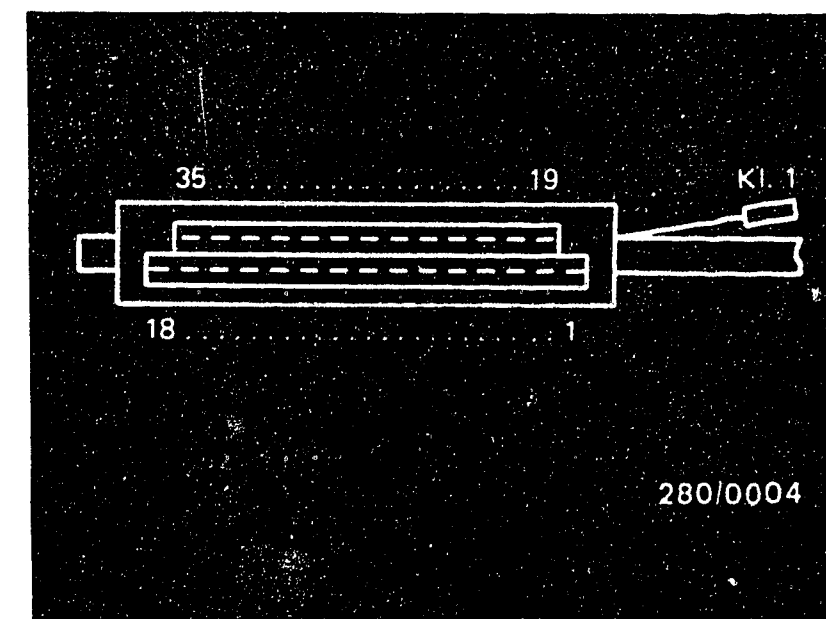


D4

Test with universal test adapter
Porsche 944

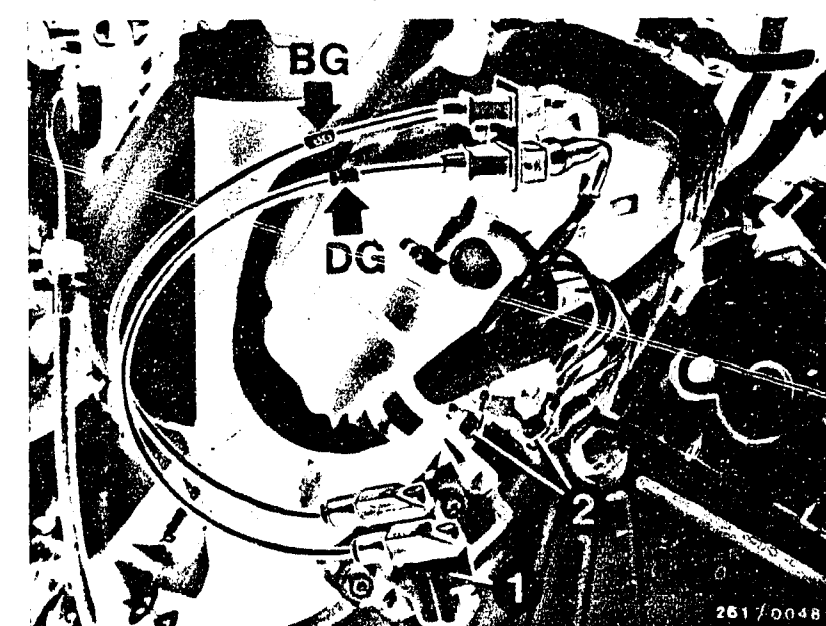


Test step 13			
Operation		Reading	Testing
Program switch position "V"	↓	Less than 15 Ω (Measured value is influenced by protective resistor in adapter) If reading O.K., continue testing with test step 16. (Test steps 14 and 15 deleted)	<u>Component:</u> Ground lead
Program switch position "Ω"	13		
Measuring equipment:			<u>Operation:</u> Contact resistance between Term. 19 and ground
Ohmmeter			
Measuring range:			
0 to 10 k Ω			
Connection:			<u>Malfunction:</u> Resistance greater than 15 Ω
Test sockets	Ω		
Operation in vehicle			
Switch off ignition			



Top view of 35-pin multiple plug of Motronic wiring harness
 Kl. 1 (Term. 1) = Plug-in connection to tachometer

BG = Reference-mark sensor
 DG = Engine-speed sensor
 1 = Mounting
 2 = Ground terminals for Motronic



Trouble-shooting

For testing, remove wiring-harness plug from adapter and, if necessary, use circuit diagram.

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω)
 From multiple plug Term. 19 to output stage ground terminal.
 From multiple plug Term. 5 to electronics ground terminal.

Eliminate contact resistances at connection points.

Spring contacts must not allow themselves to be pushed back.

D5

Test with universal test adapter
 Porsche 944

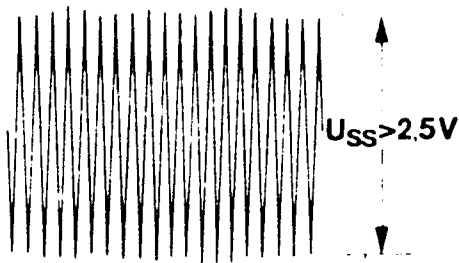


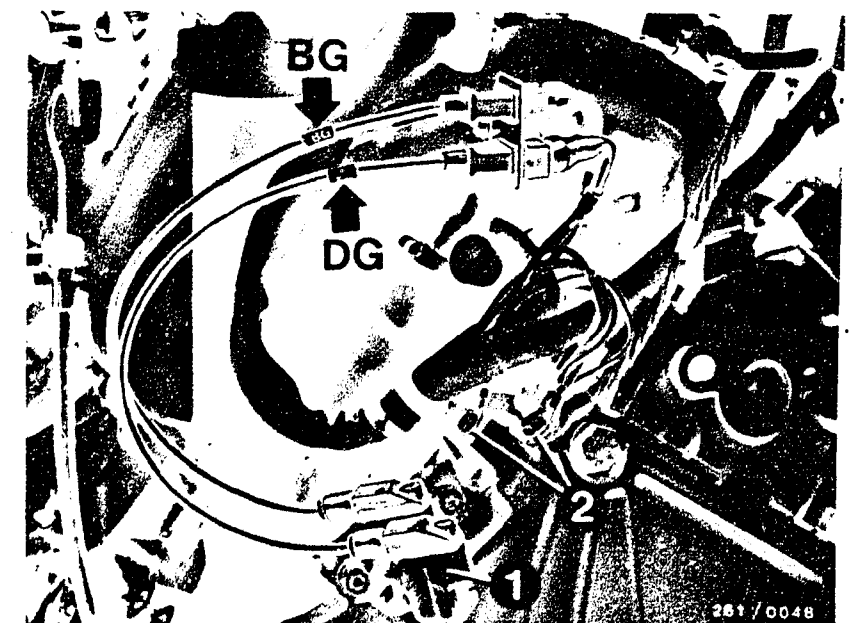
D6

Test with universal test adapter
 Porsche 944



Test step 16 (Test steps 14 and 15 deleted)

Operation		Reading	Testing
Program switch position "V"	1		Component: Engine-speed sensor
Program switch position "Ω"	15		
Measuring equipment: Motortester, oscilloscope		Lever to left-hand stop (calibrated voltage range) If reading O.K., continue testing with <u>test step 17</u> .	Operation: Amplitude (signal) at terminals 8 and 27
Measuring range: Special input			
Connection: Test wells; red clip to red well, black clip to black well			Malfunction: No signal or signal too small. Incorrect signal
Operation in vehicle: Shift gear to neutral and operate starting motor			



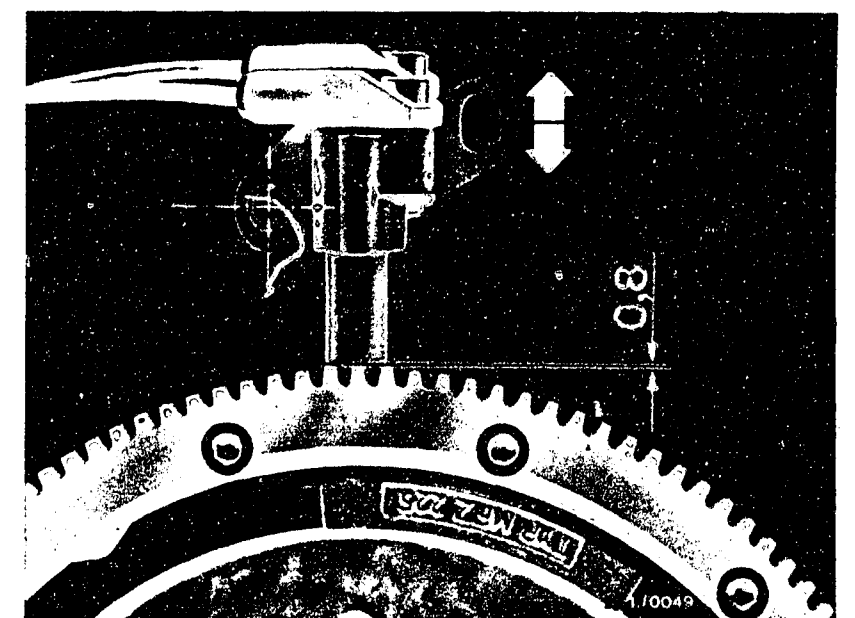
BG = Reference-mark sensor
 DG = Engine-speed sensor
 1 = Mounting
 2 = Ground terminals for Motronic

Trouble-shooting:

No signal or signal too small:

- Cranking speed below 200 min⁻¹; charge battery.
- The air gap (nominal dimension 0.8 mm) can be measured directly with a feeler gauge only with the engine removed. Slide 0.8 mm feeler gauge between ring gear and engine-speed sensor. If necessary, loosen screws on mounting and adjust air gap by turning the mounting.

Continued on D9/D10



D7

Test with universal test adapter

Porsche 944



D8

Test with universal test adapter

Porsche 944



Trouble-shooting - test step 16 (continued)

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets). Grease sensors with "Molykote Longterm 2".

Do not mix up the sensors when installing.

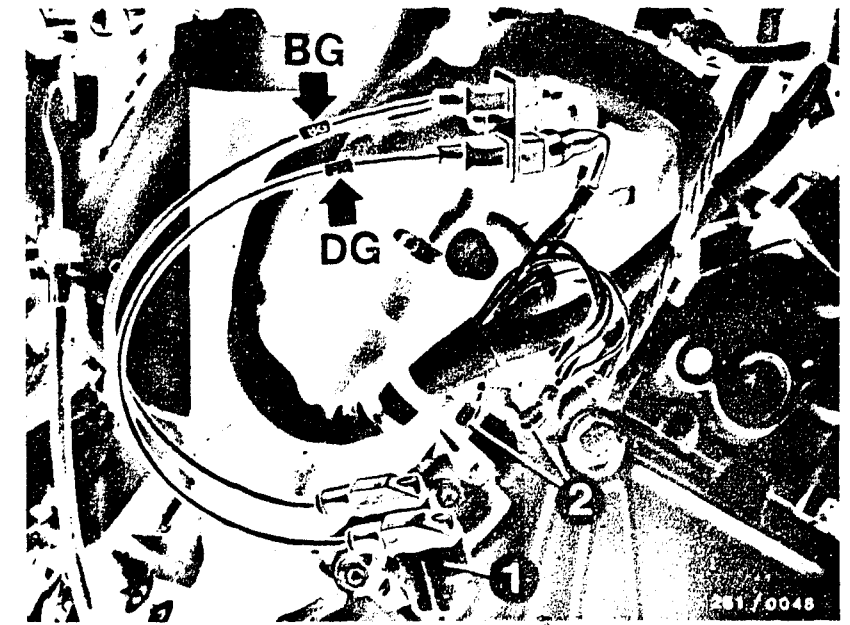
Pay attention to markings:

- Reference-mark sensor marked BG (B on mounting).
- Engine-speed sensor marked DG (D on mounting).

The sensors are plugged into the hole as far as they will go and secured. Do not use force when inserting.

When installing, make sure that the connectors are not mixed up.

Make sure that the spring contacts in the plug are correctly seated and latch in position. Spring contacts must not allow themselves to be pushed back.



BG = Reference-mark sensor
DG = Engine-speed sensor
1 = Mounting
2 = Ground terminals
for Motronic

D11

Test with universal test adapter

Porsche 944

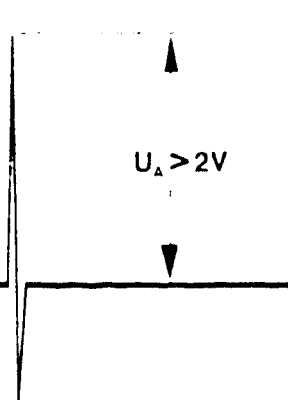


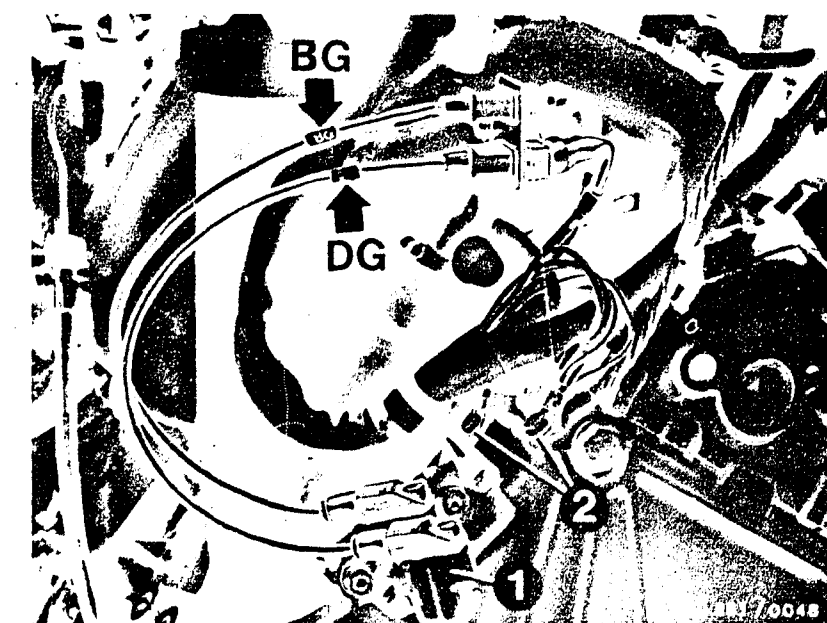
D12

Test with universal test adapter

Porsche 944



Test step 17			
Operation		Reading	Testing
Program switch position "V"	2		<u>Component:</u> Reference-mark sensor
Program switch position "Ω"			
<u>Measuring equipment:</u> Motortester, oscilloscope		<p>Automatic and manually -shifted transmission Lever to left-hand stop (calibrated voltage range)</p> <p>If reading O.K., continue testing with test step 20. (Test steps 18 and 19 deleted).</p>	<u>Operation:</u> Amplitude (signal) at terminals 25 and 26
<u>Measuring range:</u> Special input			
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			<u>Malfunction:</u> No signal or signal too small. Incorrect signal.



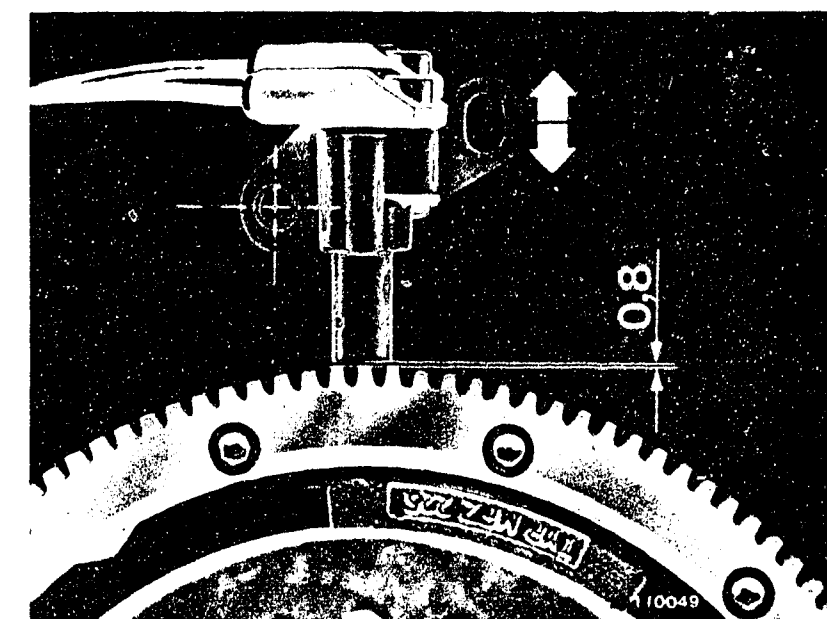
BG = Reference-mark sensor
 DG = Engine-speed sensor
 1 = Mounting
 2 = Ground terminals
 for Motronic

Trouble-shooting:

No signal or signal too small: -1

- Cranking speed below 200 min⁻¹ — charge battery.
- The nominal air gap is 0.8 mm. It is automatically adjusted to the correct setting when the engine-speed sensor air gap is adjusted. The air gap of the reference-mark sensor need only be checked if the reference-mark screw which is bonded into the flywheel is damaged or replaced. Have repairs carried out in Porsche workshop.

Continued on D15/D16



D 13

Test with universal test adapter
Porsche 944



D 14

Test with universal test adapter
Porsche 944



Trouble-shooting - test step 17 (continued)

- Replacing the reference-mark sensor:

Unscrew hexagon-socket-head cap screw on sensor. Remove dirt deposits on sensor. If necessary, apply two screwdrivers to the recesses to left and right of the sensor and raise sensor.

Caution! Do not loosen mounting.

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets): Grease sensors with "Molykote Longterm 2".

Do not mix up the sensors when installing.

Pay attention to markings:

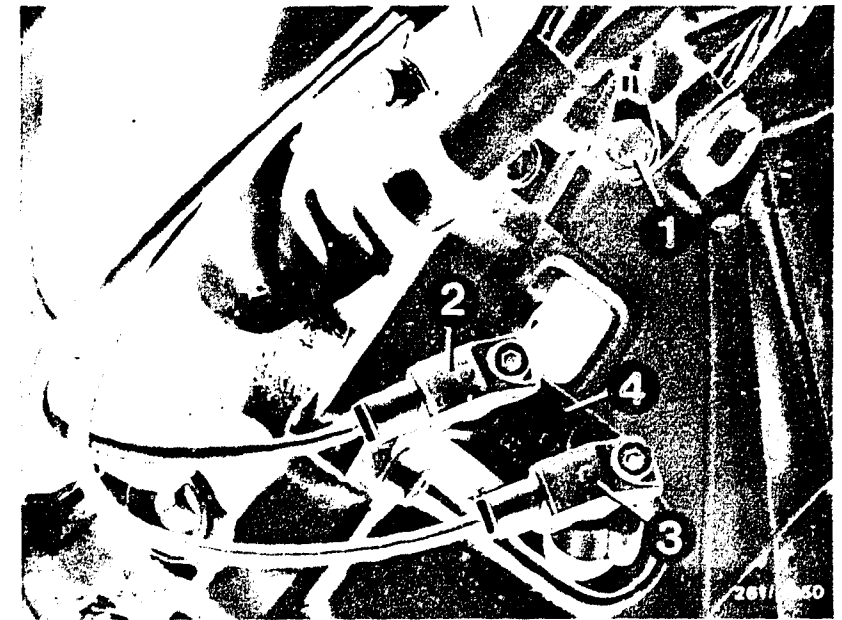
- Reference-mark sensor marked BG (B on mounting).
- Engine-speed sensor marked DG (D on mounting).

The sensors are plugged into the hole as far as they will go and secured. Do not use force when inserting.

When installing, make sure that the connectors are not mixed up.

Make sure that the spring contacts in the plug are correctly seated and latch in position. Spring contacts must not allow themselves to be pushed back.

Continued on D17/D18



- 1 = Ground terminals for Motronic
- 2 = Reference-mark sensor (B)
- 3 = Engine-speed sensor (D)
- 4 = Mounting

D15

Test with universal test adapter
Porsche 944



D16

Test with universal test adapter
Porsche 944

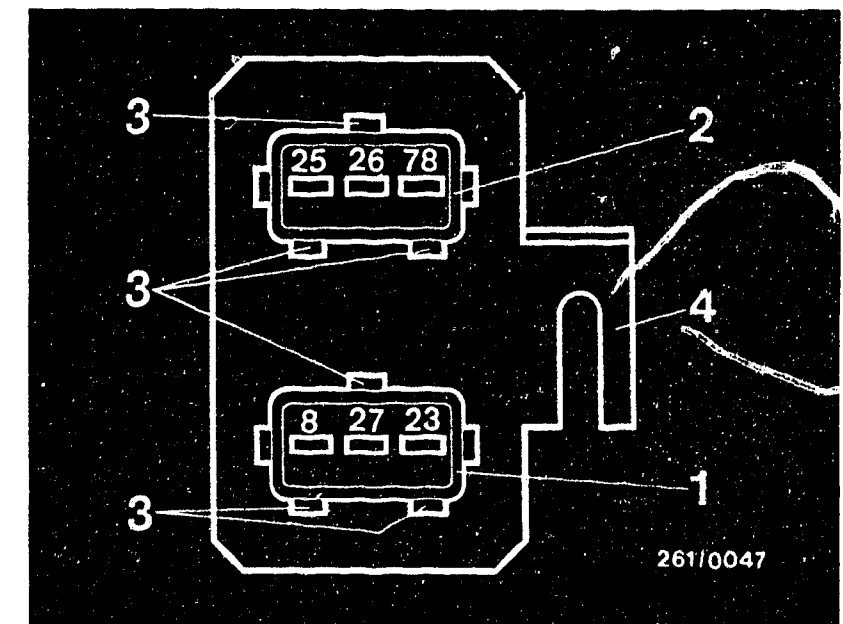


Trouble-shooting - test step 17 (continued)

• Incorrect signal:

Incorrect if negative peak comes first.

Check assignment of leads according to circuit diagram and illustration opposite.



Top view of sensor connectors

1 = Connector of engine-speed sensor

2 = Connector of reference-mark sensor with marking

3 = Locating lugs

4 = Holding plate for sensor connectors

78, 25, 26, 23, 8, 27 = Terminal numbers

D17

Test with universal test adapter
Porsche 944

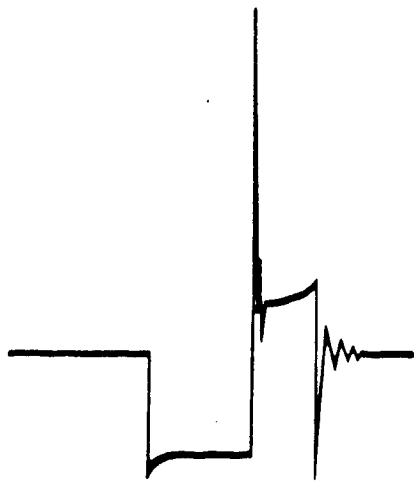
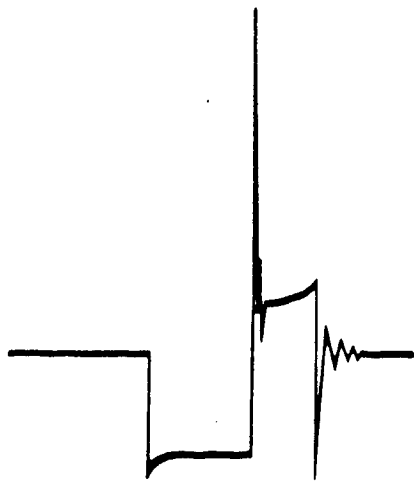


D18

Test with universal test adapter
Porsche 944

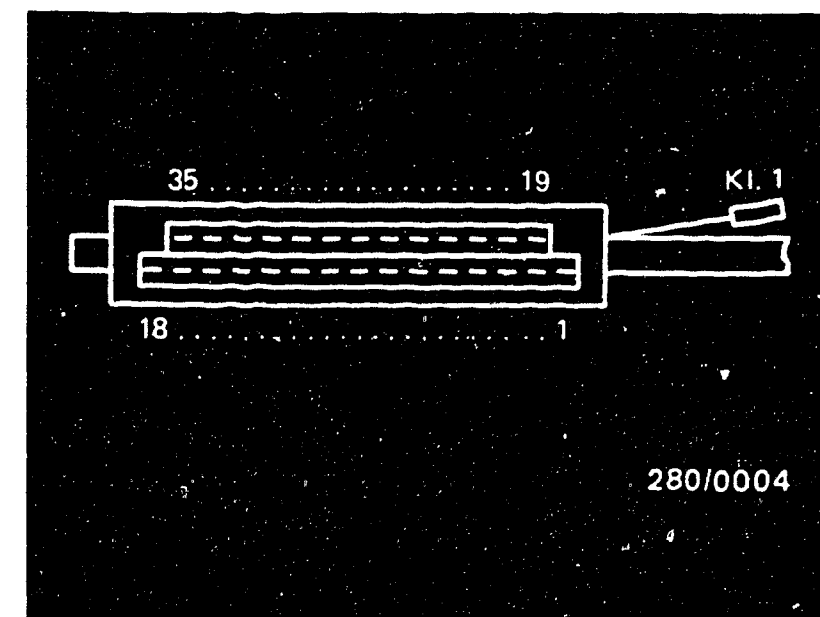


Test steps 18 and 19 deleted.

Test step 20 Ignition off. Connect control unit.			
Operation		Reading	Testing
Program switch position "V"	5	Primary signal present 	<u>Component:</u> Ignition coil, H.T. ignition cables, control unit
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Motortester, oscilloscope			<u>Operation:</u> Primary signal from ignition coil terminal 1 to ground
<u>Measuring range:</u> Special input			
<u>Connection:</u> Test wells; red clip to red well, black clip to black well, triggering on cylinder 1			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			
		<u>If reading O.K., continue testing with test step 21.</u>	<u>Malfunction:</u> No signal or incorrect signal.

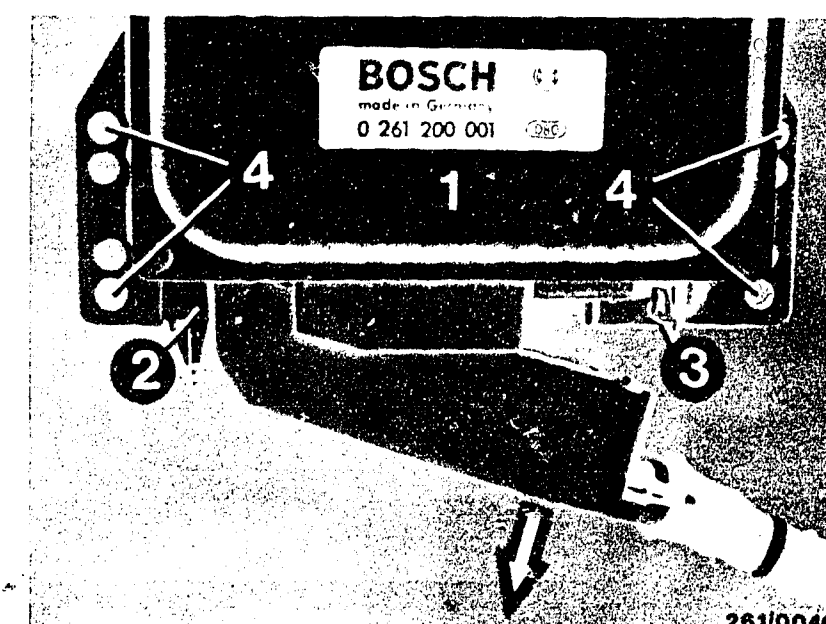
Trouble-shooting:

- Check relay set with test steps 21 and 22.
- Check Motronic ground terminals: Terminals must be bare to the metal and screws must be firmly tightened.
- Check ignition coil including leads and H.T. cables as well as plug-in connection to multiple plug Term. 1.
Spring contact on multiple plug Term. 1 must not allow itself to be pushed back.
- Check lead from ignition coil Term. 15 via central electrics A 12 to ignition lock Term. 15.
- Only replace control unit if test steps 21, 22 and 23 O.K.



Top view of 35-pin multiple plug of Motronic wiring harness
 KI. 1 (Term. 1) = Plug-in connection to tachometer

- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting hole



D 19

Test with universal test adapter
 Porsche 944

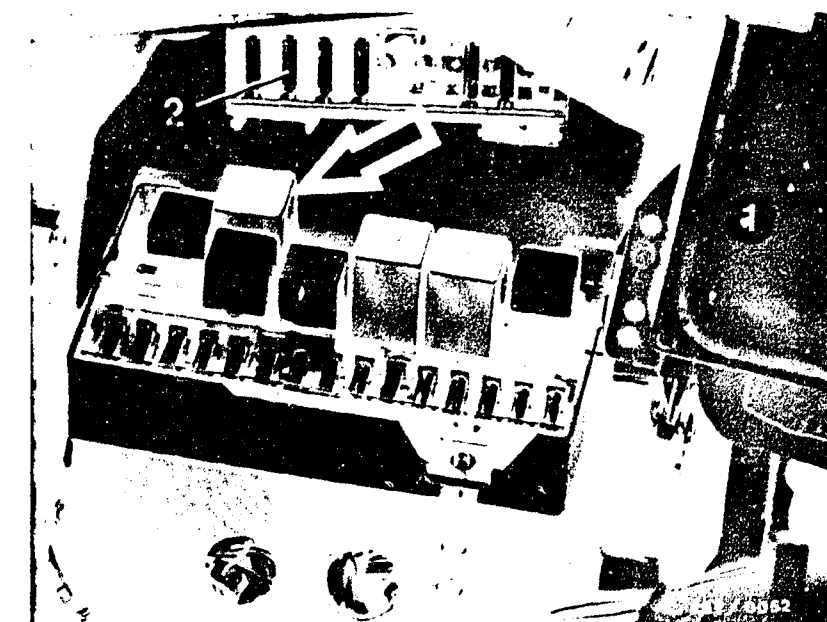


D 20

Test with universal test adapter
 Porsche 944



Test step 21			
Operation		Reading	Testing
<u>Program switch position "V"</u>	6	<u>10 ... 15 V</u>	<u>Components:</u> Relay (main relay) set
<u>Program switch position "Ω"</u>	15		
<u>Measuring equipment:</u> Voltmeter		<u>Operation:</u> Supply voltage for control unit at terminals 35 (+) and 5 (ground)	
<u>Measuring range:</u> 15 V			
<u>Connection: Test sockets, (red = +, black = ground)</u>	V		<u>Malfunction:</u> Voltage less than 10 V
<u>Operation in vehicle:</u> Switch on ignition			



Arrow = Relay set
1 = Control unit
2 = Pump fuse

Trouble-shooting:

1. Voltage less than 10 V: Battery insufficiently charged or high voltage drops at terminals.

2. No voltage reading: Check relay set.

Perform the following voltage measurements at the relay with the ignition on:

- Measure battery voltage at Term. 87, Term. 86 and Term. 30.
Measure ground connection Term. 85 to B+ (test adapter connected).
- Check lead from relay set Term. 87 via plug-in connection Term. 3 to multiple plug Term. 35.
- Check Motronic ground terminal (no. 5).

D21

Test with universal test adapter
Porsche 944

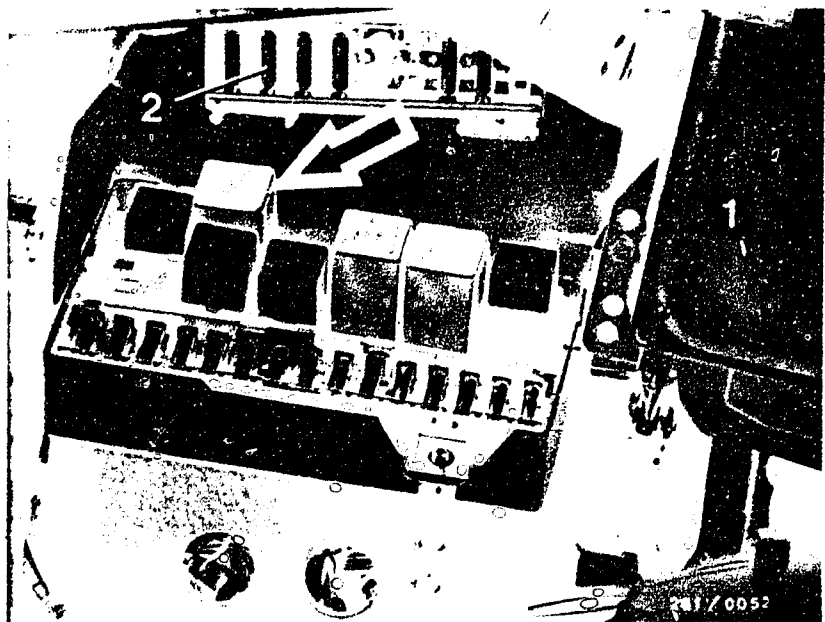


D22

Test with universal test adapter
Porsche 944



Test step 22			
Operation		Reading	Testing
Program switch position "V"	7	10 ... 15 V	<u>Components:</u> Relay (main relay) set
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Voltmeter <u>Measuring range:</u> 15 V			<u>Operation:</u> Supply voltage for control unit at terminals 18 (+) and 5 (ground)
<u>Connection:</u> Test sockets, (red = +, black = ground)	V		<u>Malfunction:</u> Voltage less than 10 V
<u>Operation in vehicle:</u> Switch on ignition			



Arrow= Relay set
 1 = Control unit
 2 = Pump fuse

Trouble-shooting:

- Check lead from multiple plug Term. 18 to plug-in connection Term. 3.

E1

Test with universal test adapter
 Porsche 944

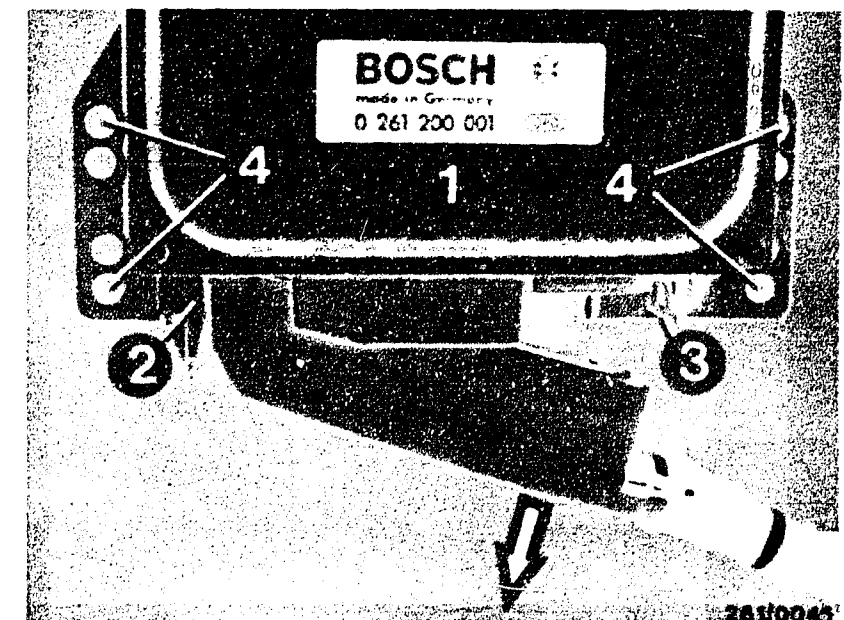


E2

Test with universal test adapter
 Porsche 944



Test step 23			
Operation		Reading	Testing
Program switch position "V"	8	Greater than 8 V	<u>Component:</u> Control unit
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Voltmeter			<u>Operation:</u> Supply voltage for air-flow sensor at terminal 9 and ground
<u>Measuring range:</u> 15 V			
<u>Connection:</u> Test sockets, (red = +, black = Ground)	V	<u>Malfunction:</u> Voltage less than 8 V	
<u>Operation in vehicle:</u> Switch on ignition			



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

Trouble-shooting:

- Replace control unit

Note

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

E3

Test with universal test adapter
Porsche 944



E4

Test with universal test adapter
Porsche 944



Test step 24			
Operation		Reading	Testing
Program switch position "V"	9	<u>150...250 mV</u> with air-flow sensor flap closed. Remove hose from air-flow sensor on air filter side and open sensor flap by hand. Sensor flap must not catch and must return automatically to its rest position when released. With the sensor flap fully open the reading rises to above 7 V (change to different measuring range). If reading O.K., continue testing with test step 27. Test steps 25 and 26 deleted.	<u>Component:</u> Air-flow sensor
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Voltmeter			
<u>Measuring range</u> 1.5 V			
<u>Connection:</u> Test sockets (red = +, black = ground) V			
<u>Operation in vehicle:</u> Switch on ignition		<u>Operation:</u> Divider voltage at terminal 7 and ground	
		<u>Malfunction:</u> No voltage or voltage too low	

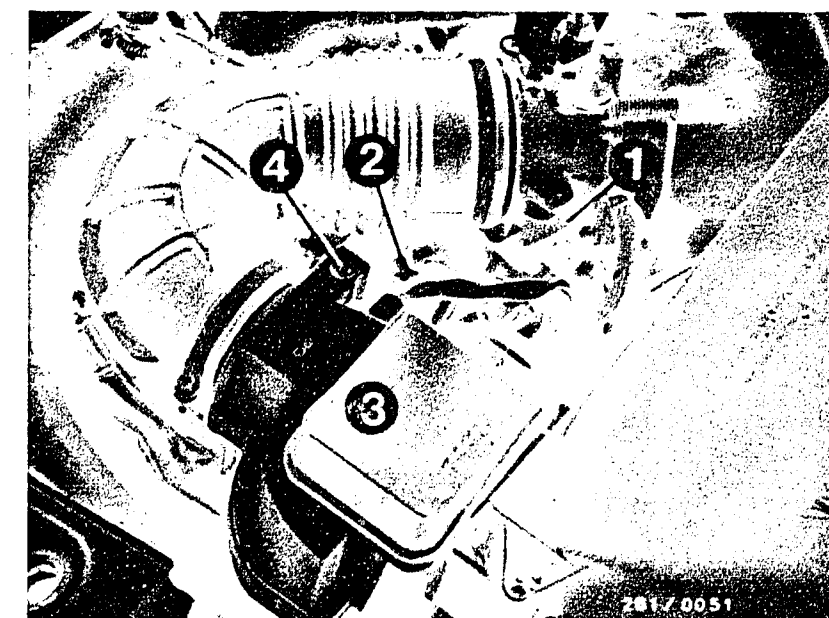
Trouble-shooting:

No reading:

- Check leads from air-flow sensor Term. 6, 7 and 9 to multiple plug Term. 6, 7 and 9.
- Spring contacts must not allow themselves to be pushed back.

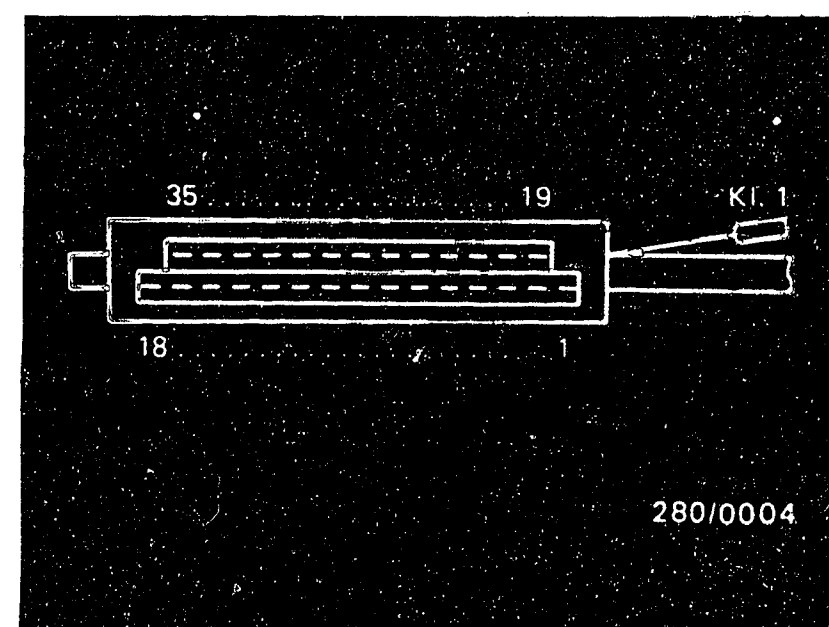
Reading outside tolerance:

- Check whether air-flow sensor flap is closing fully.
- Replace air-flow sensor.



- 1 = Throttle-valve switch
- 2 = Engine temperature sensor (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Idle-mixture-adjusting screw

Top view of 35-pin multiple plug of Motronic wiring harness
 K1. 1 (Term. 1) = Plug-in connection to tachometer



E5

Test with universal test adapter
 Porsche 944



E6

Test with universal test adapter
 Porsche 944



Test steps 25 and 26 deleted

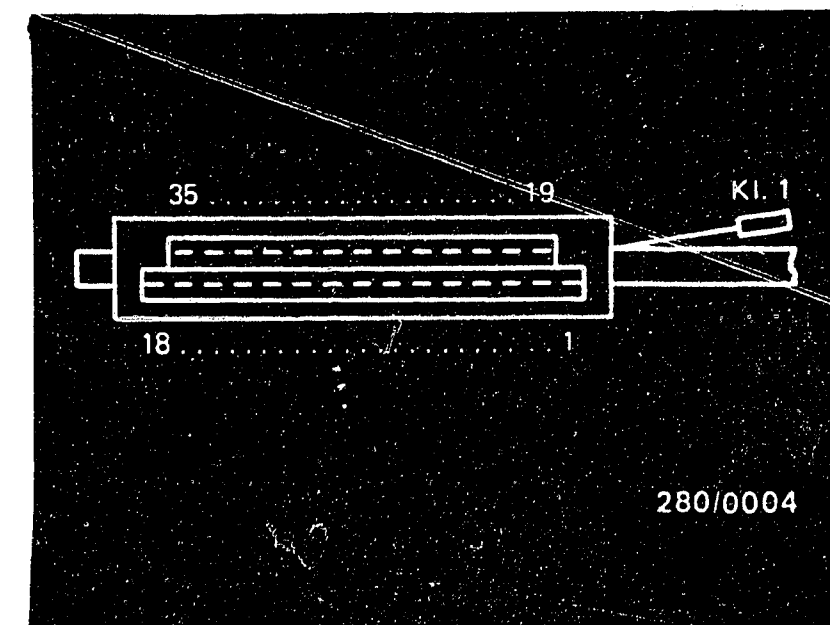
Test step 27

Operation		Reading	Testing
Program switch position "V"	12	8...15 V while cranking	<u>Component:</u> Lead 4 from starting motor Term. 50 to multiple plug Term. 4
Program switch position "Ω"	15		
Measuring equipment: Voltmeter			
Measuring range: 15 V			<u>Operation:</u> Voltage test at terminal 4
Connection: Test sockets (red = +, black = ground)	V		<u>Malfunction:</u> Voltage less than 8 V
Operation in vehicle: Shift gear to neutral and operate starting motor.			

Trouble-shooting:

1. Voltage less than 8 V:

- Test voltage drop at starting motor terminal 50.
- Check lead from multiple plug terminal 4 to starting motor terminal 50.



Top view of 35-pin
multiple plug of
Motronic wiring harness
Kl. 1 (Term. 1) = Plug-in
connection to tachometer

E7

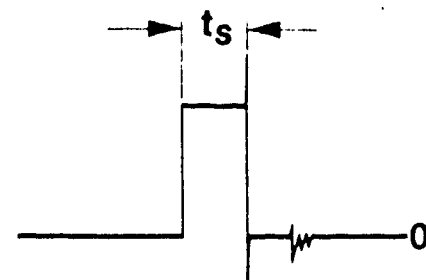
Test with universal test adapter
Porsche 944

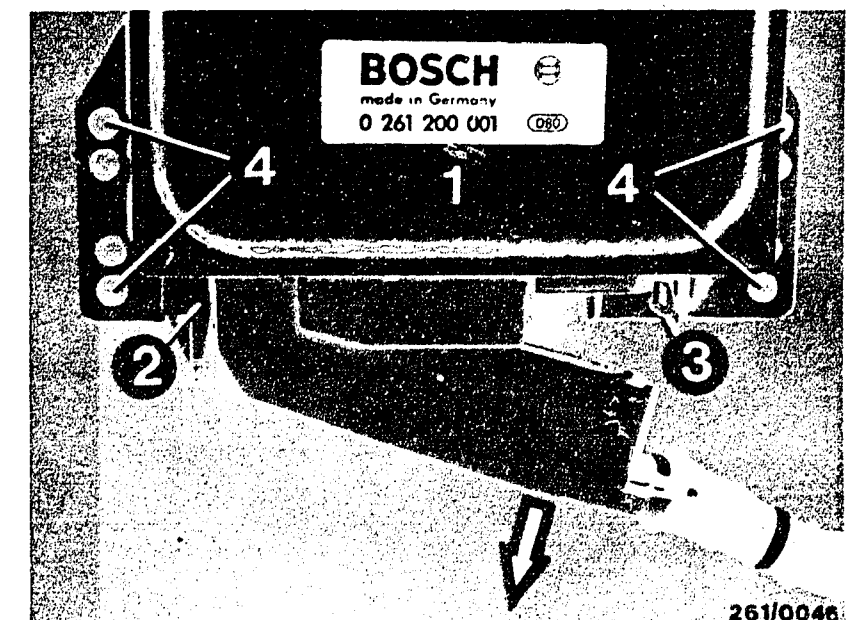


E8

Test with universal test adapter
Porsche 944



Test step 28			
Operation		Reading	Testing
Program switch position "V"	13		<u>Component:</u> Control unit
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Motortester, oscilloscope		t_s = Dwell period 0 = Base line	<u>Operation:</u> Dwell-period signal at terminal 21 and ground
<u>Measuring range:</u> Special input			<u>Malfunction:</u> No signal
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

Trouble-shooting:

- Replace control unit

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins

E9

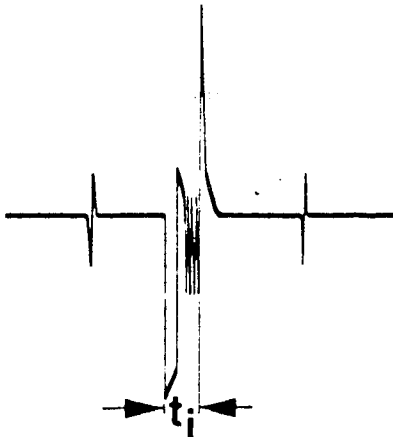
Test with universal test adapter
Porsche 944

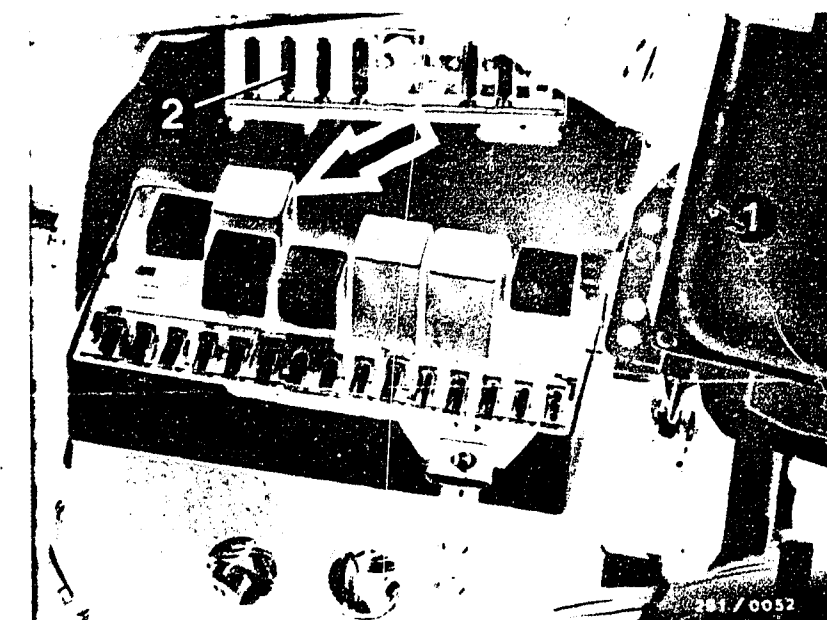


E10

Test with universal test adapter
Porsche 944



Test step 29		Reading	Testing
Operation			
Program switch position "V"	14	 t_i = Duration of injection	<u>Component:</u> Power supply for solenoid-operated injection valves, control unit
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Motortester, oscilloscope			<u>Operation:</u> Injection output stage at terminal 14 and ground
<u>Measuring range:</u> Special input			
<u>Connection:</u> Test wells; red clip to red well, black clip to black well		<u>Malfunction:</u> No signal	
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			



Arrow = Relay set
 1 = Control unit
 2 = Pump fuse

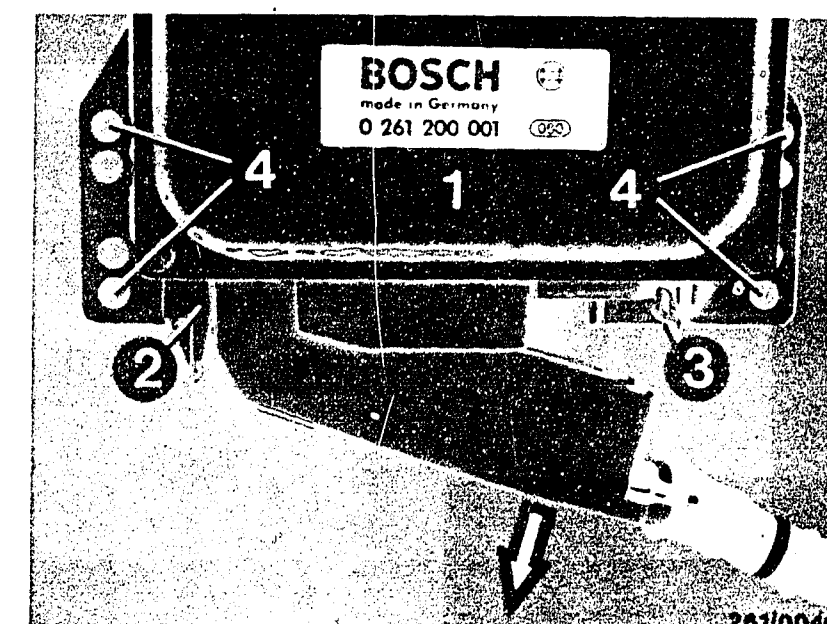
1 = Control unit
 2 = Locating lug
 3 = Detent
 4 = Mounting holes

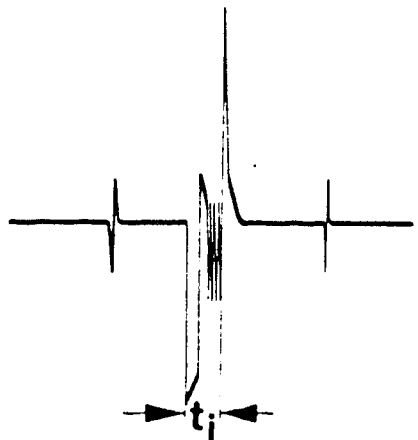
Trouble-shooting:

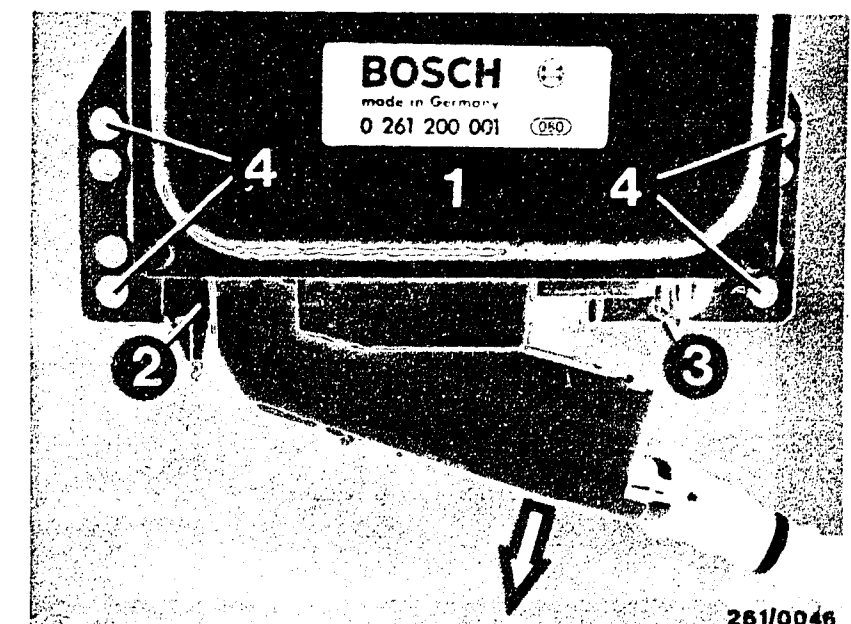
- Check power supply to injection valves:
Remove connector from all solenoid-operated injection valves and measure voltage to ground at both terminals. Battery voltage must be measured at each solenoid-operated injection valve connector. If no voltage, check lead via plug-in connection Term. 2 to relay set Term. 87.
- Test lead from multiple plug Term. 14 to injection valves of cylinders 3 and 4.
- Replace control unit.

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



Test step 30			
Operation		Reading	Testing
Program switch position "V"	14	Duration of injection t_i becomes slightly longer after pressing button T1 (NTC II, cold). Only press T1 briefly; otherwise mixture will be too rich for engine.	<u>Component:</u> Control unit
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Motortester, oscilloscope			
<u>Measuring range:</u> Special input			
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			
<u>Button:</u> Press T1			<u>Malfunction:</u> Signal does not become wider after pressing button T1
		t_i = Duration of injection	



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

Trouble-shooting:

Replace control unit

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

E13

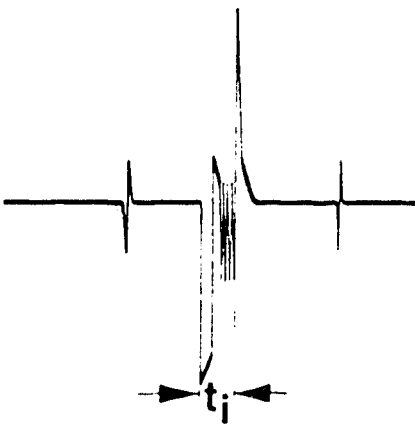
Test with universal test adapter
Porsche 944

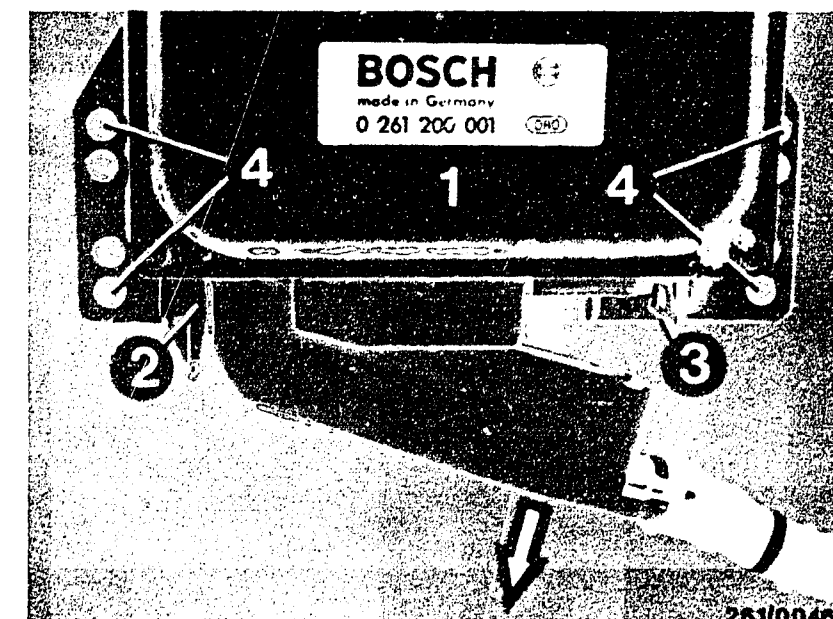


E14

Test with universal test adapter
Porsche 944



Test step 31		Reading	Testing
Operation			
<u>Program switch position</u> "V"	15	 t_i = Duration of injection	<u>Component:</u> Control unit
<u>Program switch position</u> "Ω"	15		
<u>Measuring equipment:</u> Motortester, oscilloscope			<u>Operation:</u> Injection output stage at terminal 15 and ground
<u>Measuring range:</u> Special input			<u>Malfunction:</u> No signal
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

Trouble-shooting:

- Check power supply to injection valves:
Remove connector from all solenoid-operated injection valves and measure voltage to ground at both terminals. Battery voltage must be measured at each solenoid-operated injection valve connector. If no voltage, check lead via plug-in connection Term. 2 to relay set Term. 87.
- Test lead from multiple plug Term. 15 to injection valves of cylinders 1 and 2.
- Replace control unit.

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

E15

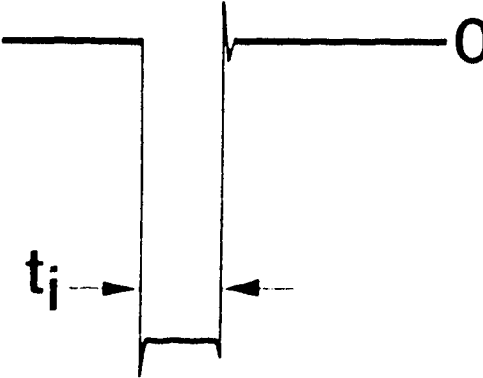
Test with universal test adapter
Porsche 944

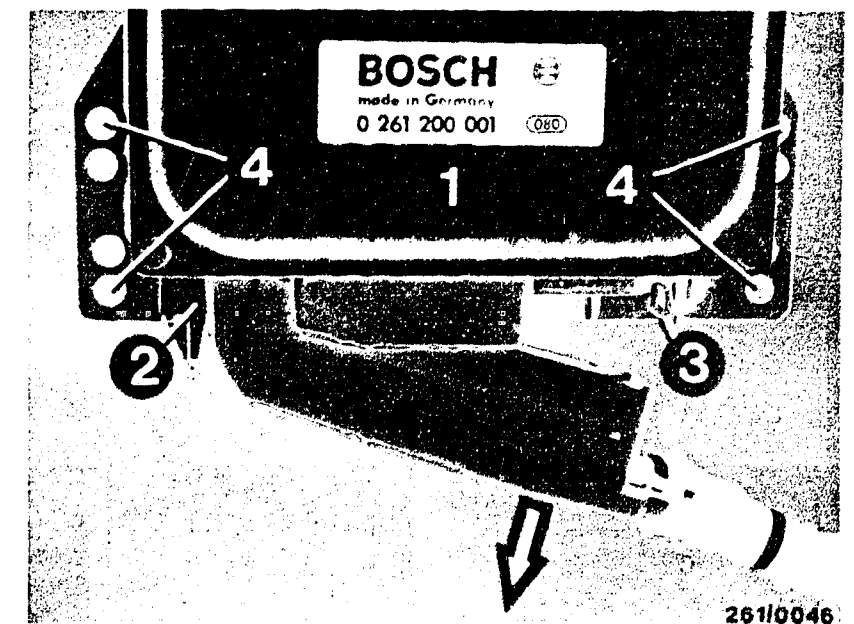


E16

Test with universal test adapter
Porsche 944



Test step 32			
Operation		Reading	Testing
Program switch position "V"	16		Component: Control unit
Program switch position "Ω"	15		
Measuring equipment: Motortester, oscilloscope			Operation: Injection signal at terminal 11 and ground
Measuring range: Special input			Malfunction: No signal
Connection: Test wells; red clip to red well, black clip to black well			
Operation in vehicle: Shift gear to neutral and operate starting motor			



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

Trouble-shooting:

Replace control unit.

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins

E17

Test with universal test adapter
Porsche 944

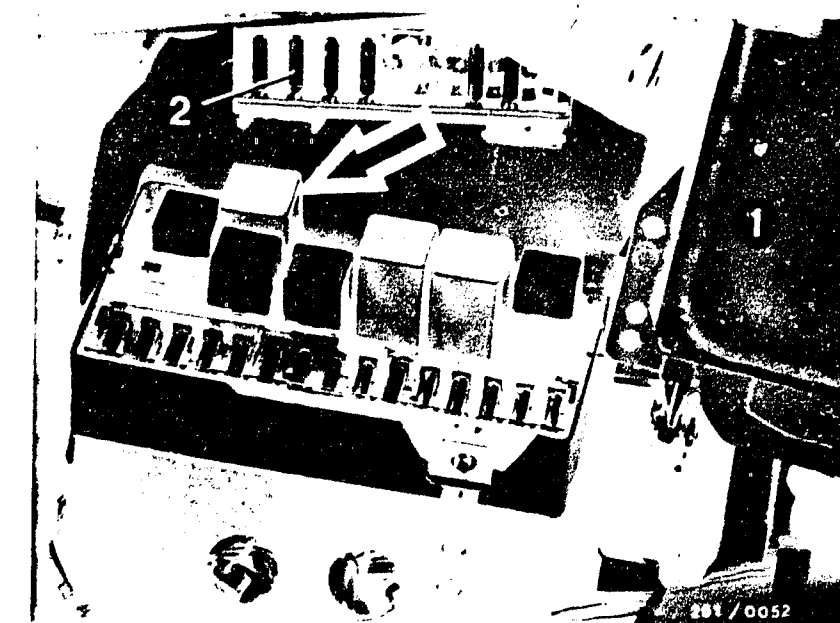


E18

Test with universal test adapter
Porsche 944



<u>Test step 33</u>			
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch position</u> "V"	17	<u>10...15 V</u>	<u>Component:</u> Relay set (pump relay)
<u>Program switch position</u> "Ω"	15		
<u>Measuring equipment':</u> Voltmeter			<u>Operation:</u> Voltage at Term. 20 to ground
<u>Measuring range:</u> 15 V			
<u>Connection: Test sockets;</u> (red = +, black = ground)	V		<u>Malfunction:</u> Voltage less than 10 V
<u>Operation in vehicle:</u> Ignition on			



Arrow = Relay set
1 = Control unit
2 = Pump fuse

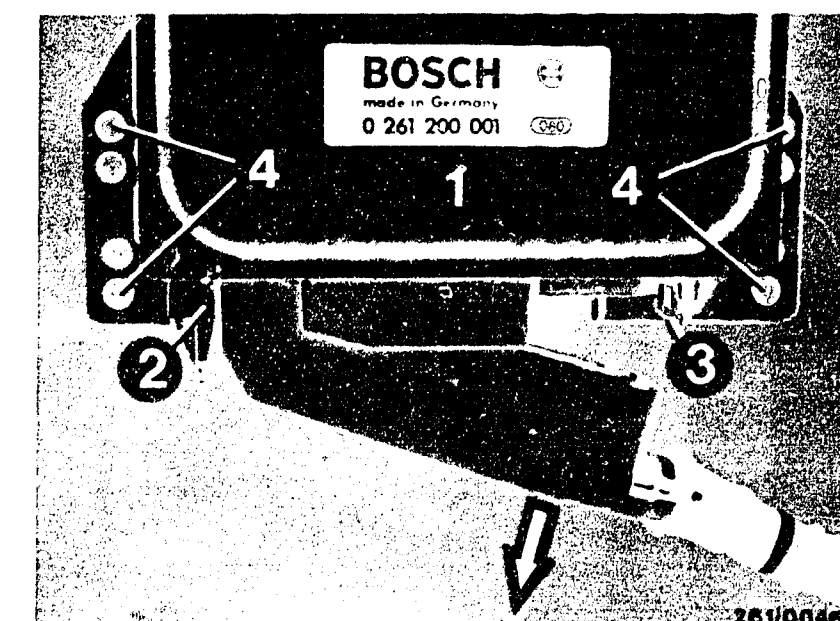
1 = Control unit
2 = Locating lug
3 = Detent
4 = Mounting holes

Trouble-shooting:

- Replace relay set.
- Check lead from multiple plug Term. 20 via plug-in connection Term. 5 to relay set Term. 85b.
- Replace control unit.

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



E19

Test with universal test adapter
Porsche 944

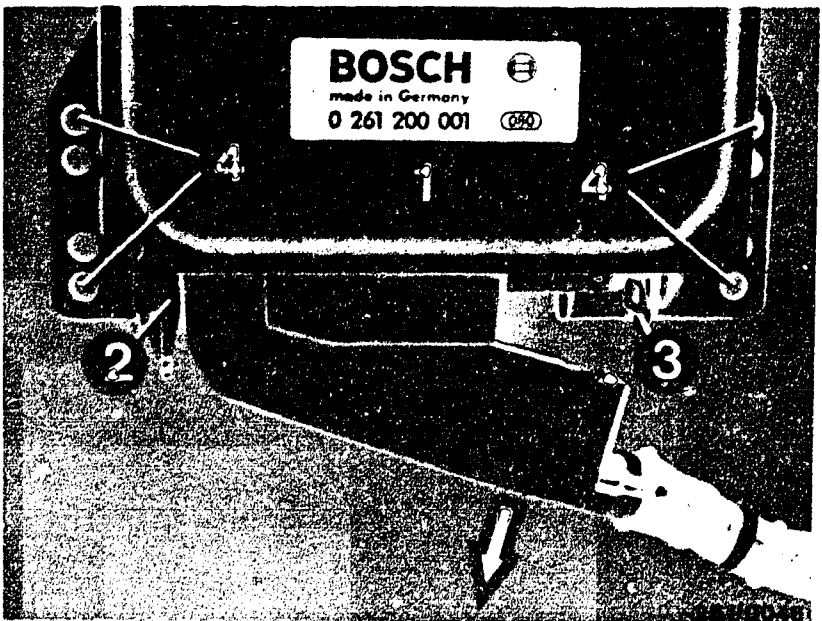


E20

Test with universal test adapter
Porsche 944



Test step 34				
Operation		Reading	Testing	
Program switch position "V"	17	max. 4 V	<u>Component:</u> Control unit	
Program switch position "Ω"	15			
<u>Measuring equipment:</u> Voltmeter			<u>Operation:</u> Pump control Term. 20 to ground	
<u>Measuring range:</u> 15 V				
Connection: Test sockets; (red = +, black = ground)	V			<u>Malfunction:</u> Voltage greater than 4 V
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor				



- 1 = Control unit
- 2 = Locating lug
- 3 = Detenting
- 4 = Mounting holes

Trouble-shooting:

Replace control unit

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

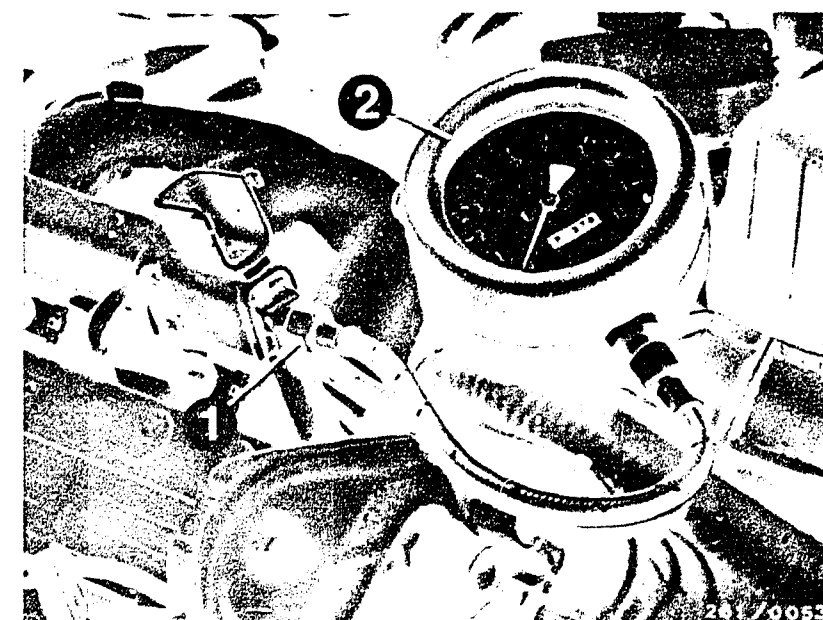


Test step 35 Switch off ignition. Connect pressure gauge.			
Operation		Reading	Testing
<u>Program switch position</u> "V"	17	<u>2.3 to 2.7 bar</u>	<u>Component:</u> Pump relay, fuel pump, pressure regulator
<u>Program switch position</u> "Ω"	15		
<u>Measuring equipment:</u> Pressure gauge		If reading O.K., continue testing with <u>test step 36.</u>	<u>Operation:</u> Fuel pressure
<u>Measuring range:</u> 0 to 6 bar			
<u>Connection:</u> At test connection			
<u>Operation in vehicle:</u> Switch on ignition			<u>Malfunction:</u> No fuel pressure or pressure outside tolerance
<u>Button:</u> Press T3			

Note:

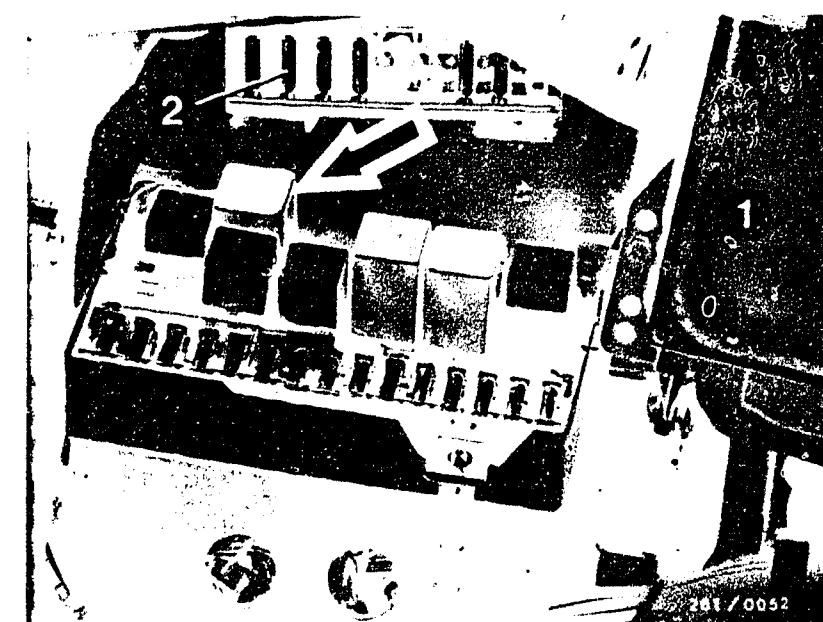
Mount pressure gauge (2) at test connection (1) on fuel-distribution pipe. Pay attention to built-in ball when opening the cap nut. Catch any escaping gasoline. Danger of fire with hot engine and electric sparks.

Continued on F1/F2



1 = Test connection
2 = Pressure gauge

Arrow = Relay set
1 = Control unit
2 = Pump fuse



E23

Test with universal test adapter
Porsche 944



E24

Test with universal test adapter
Porsche 944



Trouble-shooting - test step 35

1. Pressure 0 bar, no pumping noises can be heard:

- Test pump fuse.
- Replace relay set.
- Measure voltage at disconnected pump plug.

No voltage:

Check lead from fuel pump to relay set Term. 87b as well as pump ground lead.

- Voltage present:

Test pressure regulator and fuel pump, as described under 2. below.

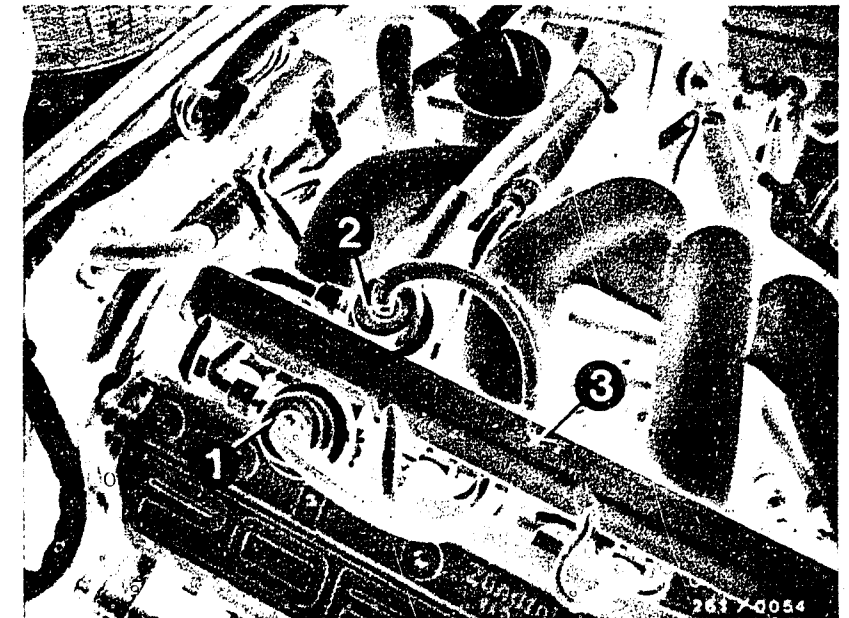
2. Pressure outside tolerance, fuel pump operating:

- Fuel pressure too low:

Slowly pinch off return line with hose clammer. Pressure rises above 4 bar — replace pressure regulator.

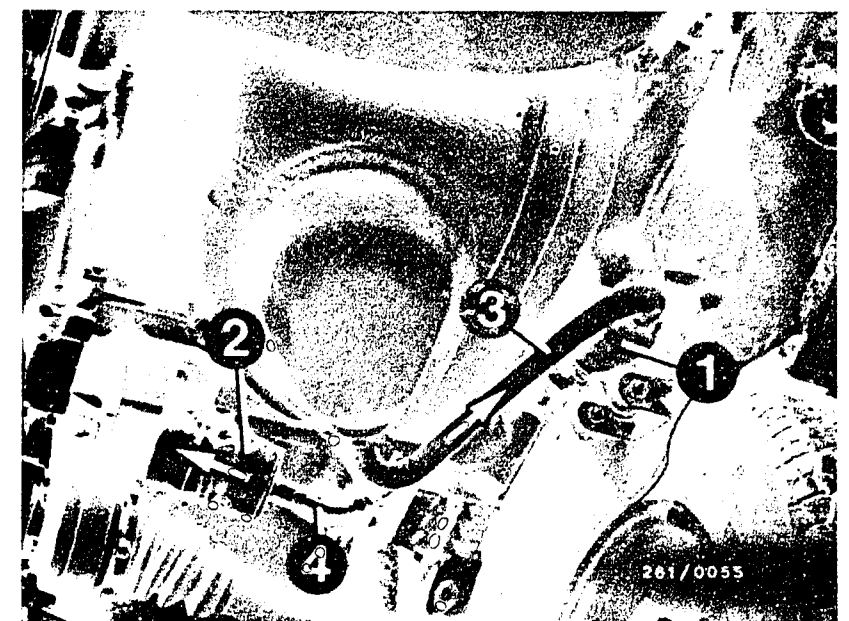
Pressure remains below 4 bar — replace fuel pump.

Continued on F3/F4



- 1 = Pressure regulator
- 2 = Fuel-line-pressure damper
- 3 = Fuel-distribution pipe
- 4 = Air hose to intake manifold
- 5 = Return hose

- 1 = Electric fuel pump
- 2 = Fuel filter
- 3 = Fuel intake line
- 4 = Fuel delivery line
- Arrow = Direction of flow



F1

Test with universal test adapter
Porsche 944



F2

Test with universal test adapter
Porsche 944

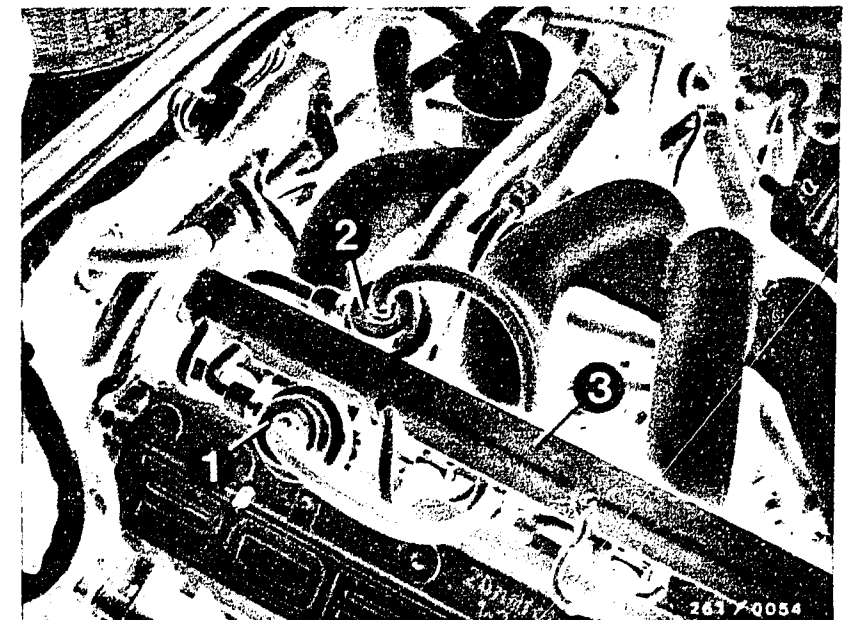


Trouble-shooting - test step 35 (continued)

- Check fuel line and fuel filter for throughflow. Fuel lines pinched?
- Strainer in tank clogged?
- Corrosion in tank?

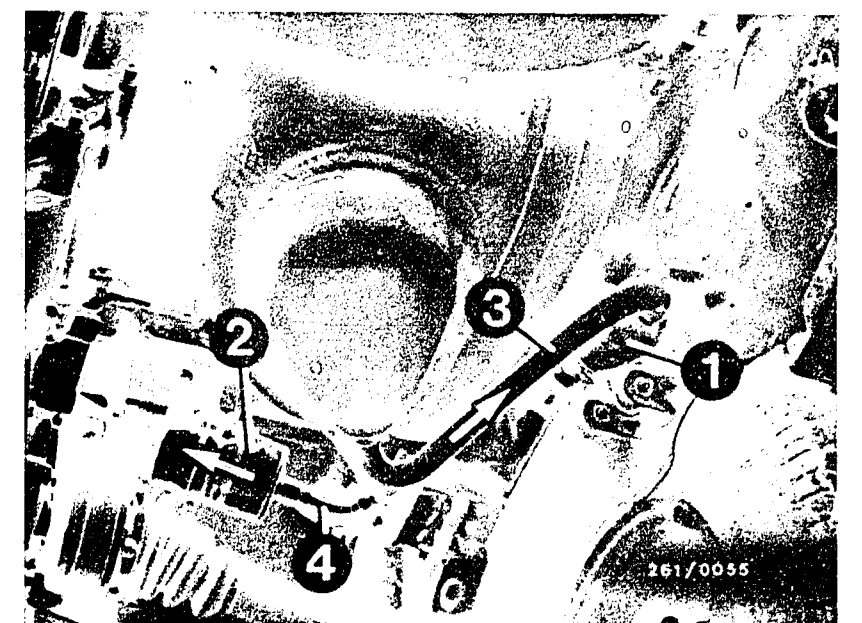
3. Fuel pressure above 2.7 bar:

- Fuel return line clogged or pinched.
- Replace pressure regulator



- 1 = Pressure regulator
- 2 = Fuel-line-pressure damper
- 3 = Fuel-distribution pipe
- 4 = Air hose to intake manifold
- 5 = Return hose

- 1 = Electric fuel pump
- 2 = Fuel filter
- 3 = Fuel intake line
- 4 = Fuel delivery line
- Arrow = Direction of flow

**F3**

Test with universal test adapter
Porsche 944

**F4**

Test with universal test adapter
Porsche 944



CAUTION!

The following test steps can only be performed with the engine running.
If the engine will not run, continue with the trouble-shooting program of your choice.
Detailed trouble-shooting - see B3 - B4
Direct trouble-shooting - See B5 - B10
For further trouble-shooting, leave the test adapter, control unit and pressure gauge connected.

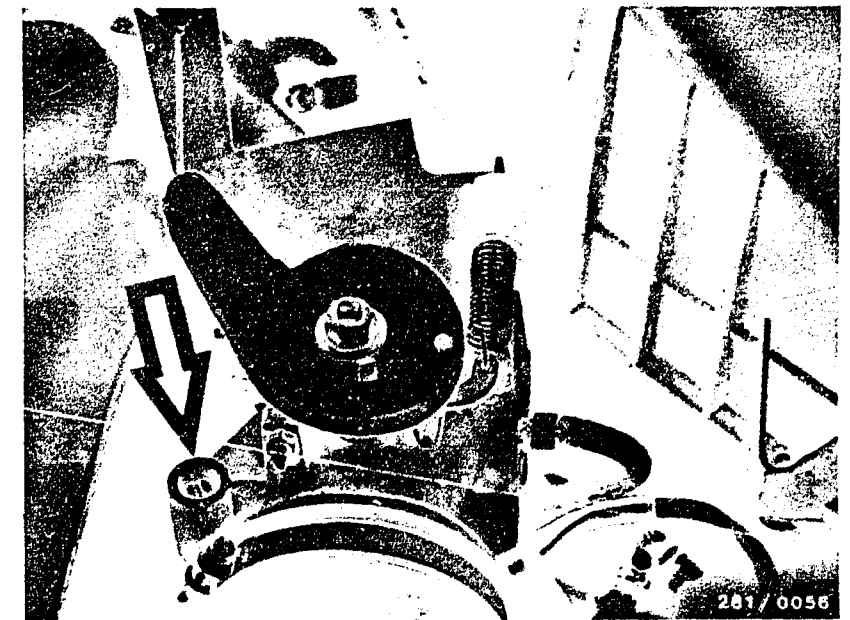
Test step 36 Connect motortester and CO analyzer

Operation		Reading	Testing
Program switch position "V"	17	1. With engine at normal operating temperature: Idle speed: <u>800...850 min⁻¹</u> CO concentration: <u>0.5...1.0 % by Vol. CO</u> 2. Press button T2: Readings must not change.	Component: Engine, leaks in air-intake system
Program switch position "Q"	15		
Measuring equipment: Motortester and CO analyzer			Operation: Idle speed and exhaust
Measuring range: Engine speed and CO			
Connection: Ignition coil, exhaust			Malfunction: Readings outside tolerance
Operation in vehicle Allow engine to reach operating temperature			

Trouble-shooting:

- Adjust idle speed at idle-speed-adjusting screw in throttle-valve assembly.

Continued on F7/F8



Arrow = Idle-mixture-adjusting screw

F5

Test with universal test adapter
Porsche 944



F6

Test with universal test adapter
Porsche 944



Trouble-shooting - test step 36 (continued)

- Adjust the exhaust using the idle-mixture-adjusting screw in the air-flow sensor. To do this, remove the plug in the air-flow sensor. After finishing the adjustment, use a new plug (red).

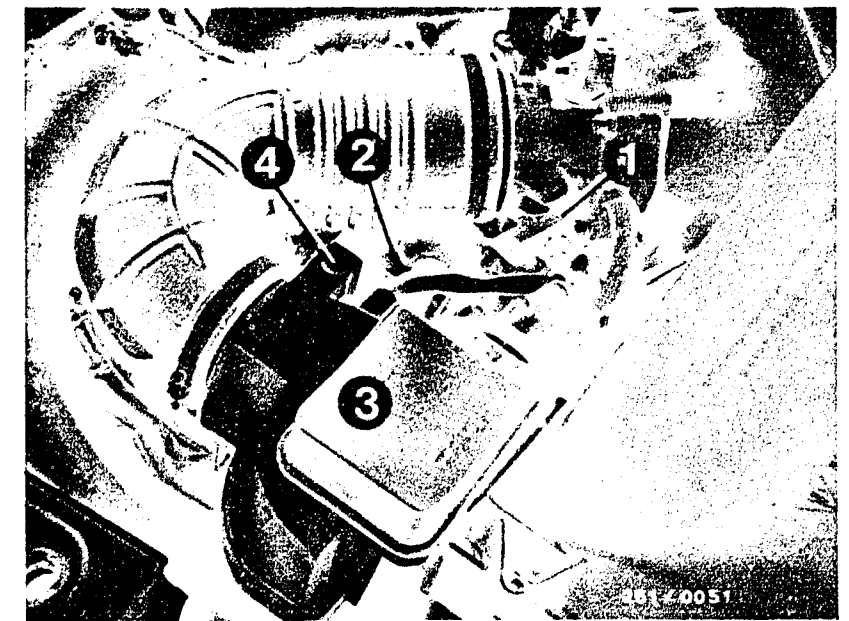
Turning the idle-mixture-adjusting screw in a clockwise direction:
Increases the CO concentration.

Turning the idle-mixture-adjusting screw in a counterclockwise direction:
Reduces the CO concentration.

CO concentration less than 0.5 % by vol. CO and not adjustable:
Check the intake side and the exhaust system for leaks (unmetered air) by means of pressure test.

Concerning 2.

If the readings change after pressing button T2, the engine is not yet at normal operating temperature.



- 1 = Throttle-valve switch
- 2 = Engine temperature sensor (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Idle-mixture-adjusting screw

F7

Test using universal test adapter
Porsche 944



F8

Test using universal test adapter
Porsche 944



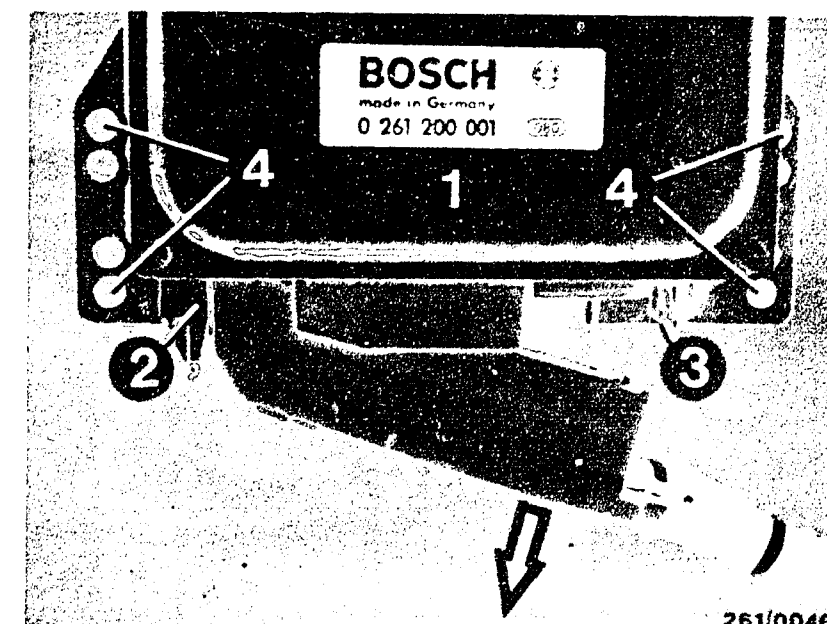
Test step 37			
Operation		Reading	Testing
Program switch position "V"	17	1. With engine at normal operating temperature and at idle speed: 5...15°	Component: Control unit
Program switch position "Ω"	15		
Measuring equipment: Motortester		2. Press button T6 (full load) and increase engine speed to 3000 min ⁻¹ Spark advance 18°..28°	Operation: Spark advance at idle and at full load
Measuring range: Spark advance			Malfunction: Spark advance outside tolerance
Connection: Timing light			
Operation in vehicle: Allow engine to reach operating temperature.			

Trouble-shooting:

- Concerning 1. (above): Check idle speed accurately once again, and repeat test step. Idle speed must be between 800 and 850 min⁻¹, otherwise a different spark advance will be indicated.
- Concerning 2.: Bring engine up to stated engine speed once again and read off spark advance
- Replace control unit

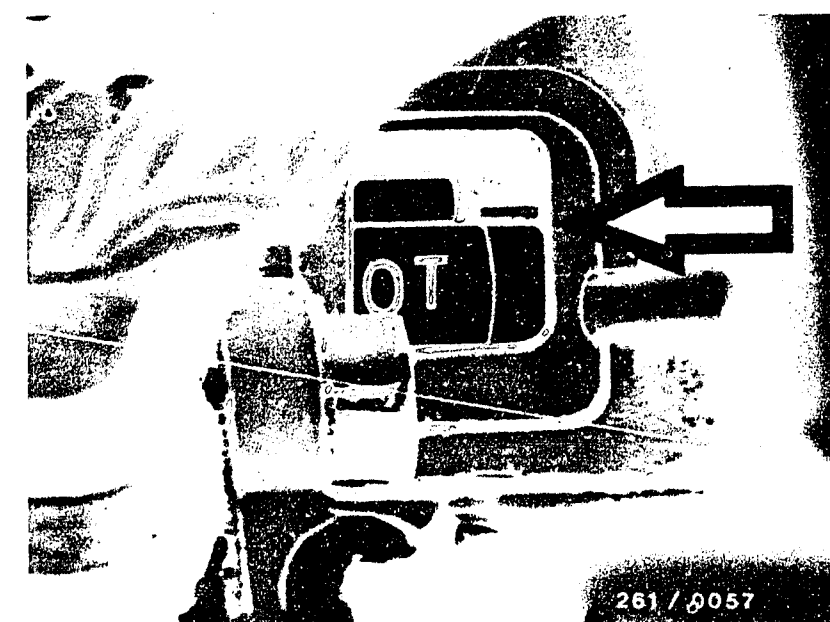
Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

TDC mark on flywheel and cast-on piece on clutch housing must be in alignment.



F9

Test with universal test adapter
Porsche 944



F10

Test with universal test adapter
Porsche 944



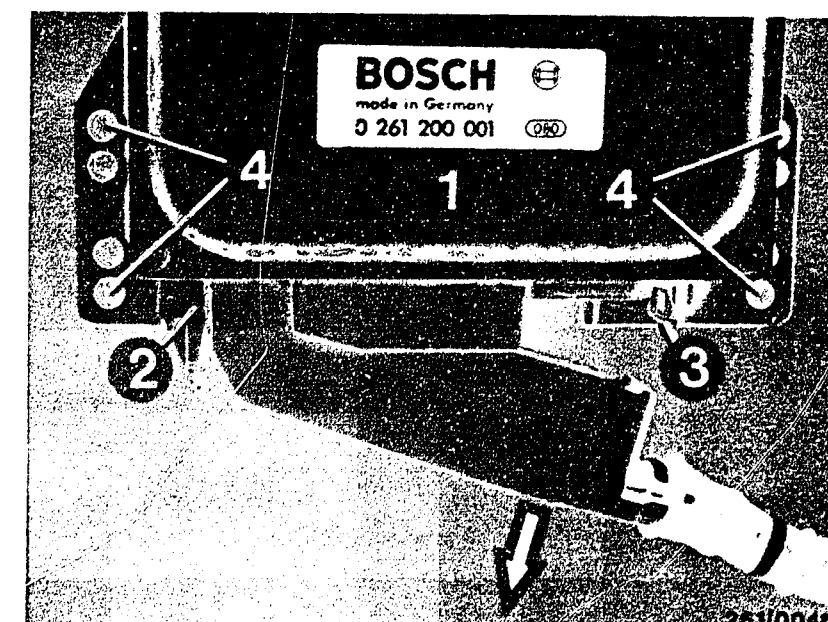
Test step 38			
Operation		Reading	Testing
Program switch position "V"	17	1. With engine at normal operating temperature and at idle speed: <u>8...15 °</u> 2. At 3000 min ⁻¹ <u>30...45 °</u>	Component: Control unit
Program switch position "Ω"	15		
Measuring equipment: Motortester			Operation: Dwell angle
Measuring range: Dwell angle			
Connection: Ignition coil			Malfunction: Dwell angle outside tolerance
Operation in vehicle: Let engine run			

Trouble-shooting:

Replace control unit

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

F11

Test with universal test adapter
Porsche 944

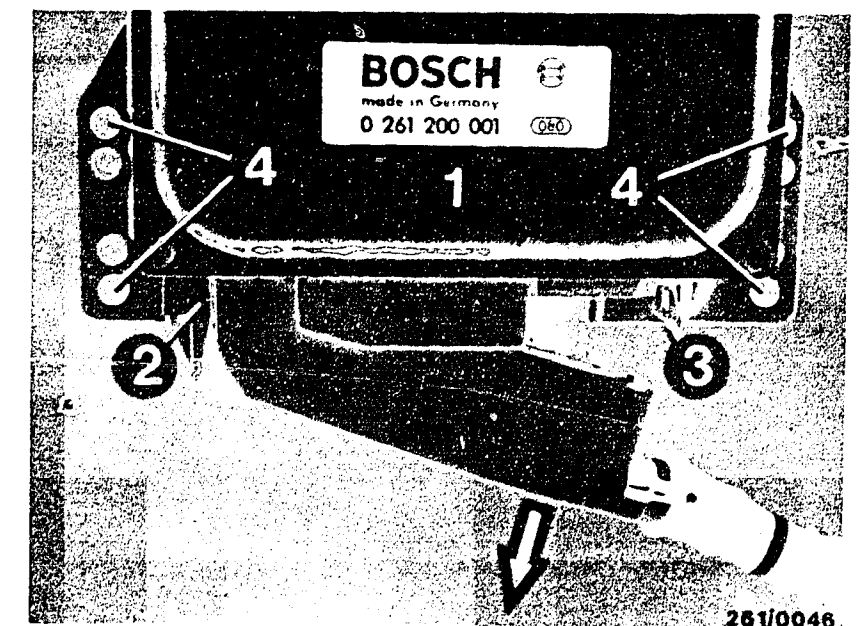


F12

Test with universal test adapter
Porsche 944



Test step 39		Reading	Testing
Operation			
Program switch position "V"	17	Engine at normal operating temperature Engine speed 2000 min ⁻¹ (keep accelerator in same position). Press button T5: <u>Engine "hunts"</u> i.e. Engine speed drops to approx. 900 - 1200 min ⁻¹ . Then engine speed rises again to approx. 2000 min ⁻¹ and then drops again, and so on.	<u>Component:</u> Control unit
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Motortester			<u>Operation:</u> Cutting off of injection pulses (overrun cutoff)
<u>Measuring range:</u> Engine speed			
<u>Connection:</u> Ignition coil			
<u>Operation in vehicle:</u> Let engine run			
<u>Button:</u> Press T5		<u>Malfunction:</u> No cutoff	



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

Trouble-shooting:

Replace control unit

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

F13

Test with universal test adapter
Porsche 944



F14

Test with universal test adapter
Porsche 944



Testing with the Universal test adapter is now completed.
If the fault has not been found or if you require
further information and instructions on how to remedy
the fault, continue with the trouble-shooting program
of your choice.

Detailed trouble-shooting → see B3-B4
Direct trouble-shooting → see B5-B10

F15

Test with test adapter
Porsche 944



10. Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

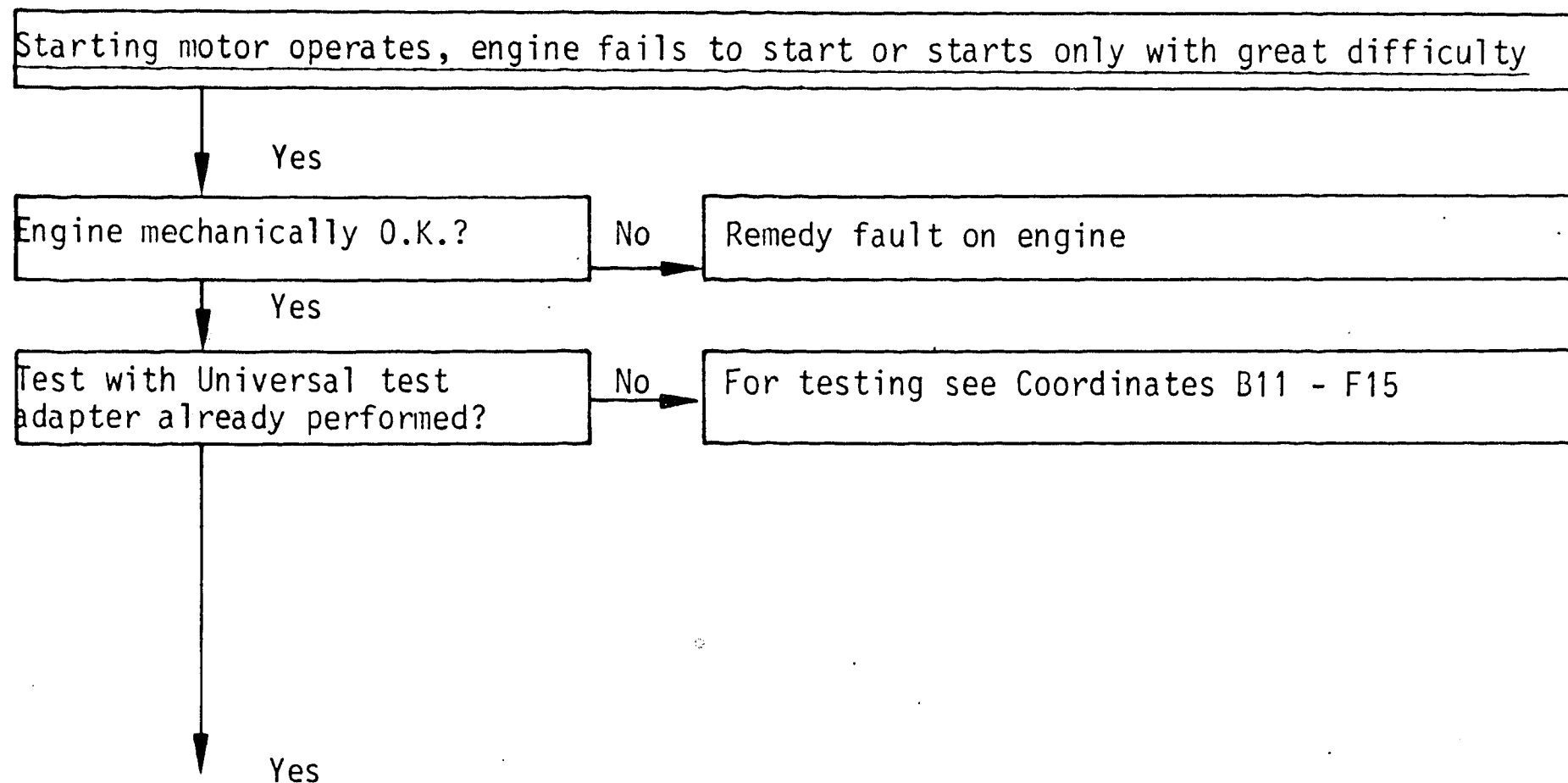
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on F18/F19

F16

Engine fails to start

Porsche 944



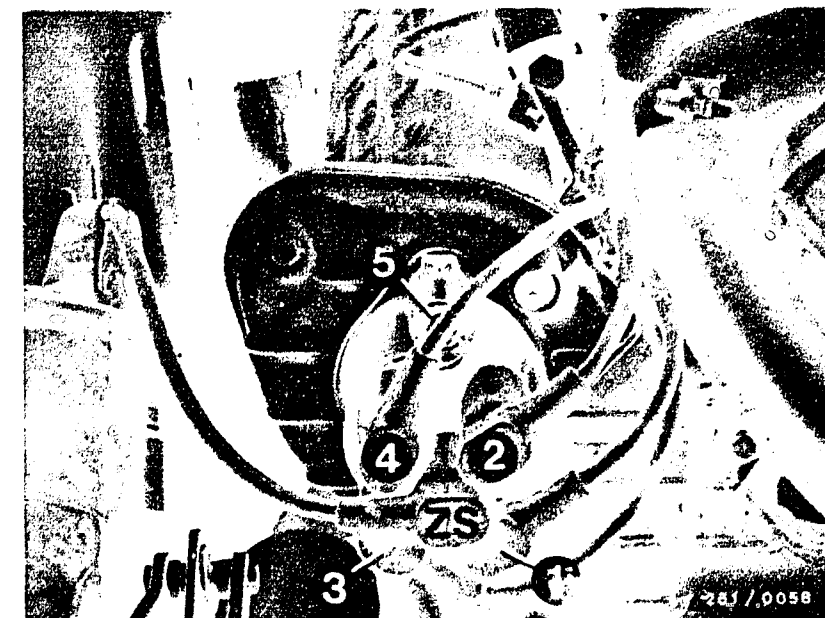
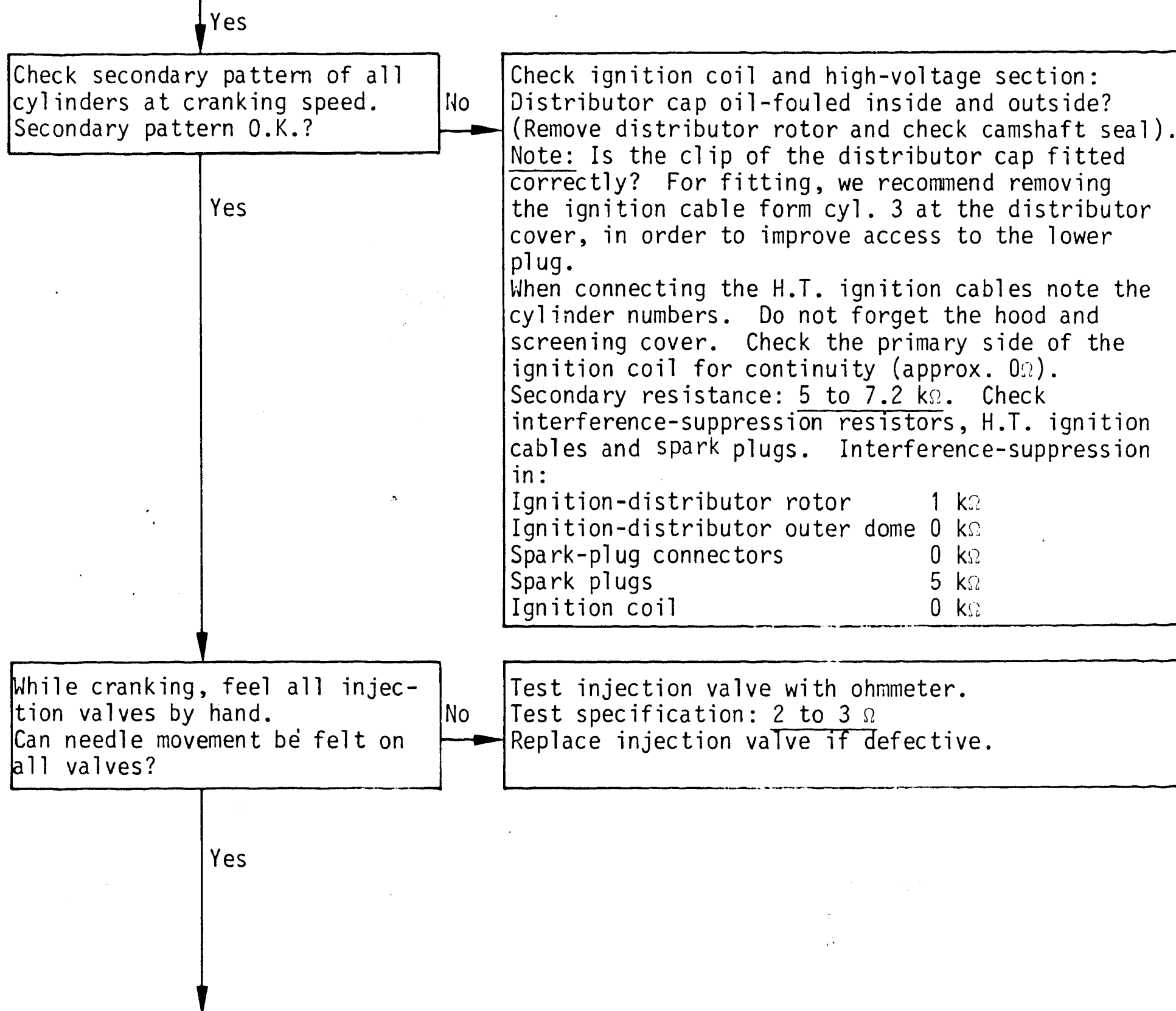
F17

Engine fails to start

Porsche 944

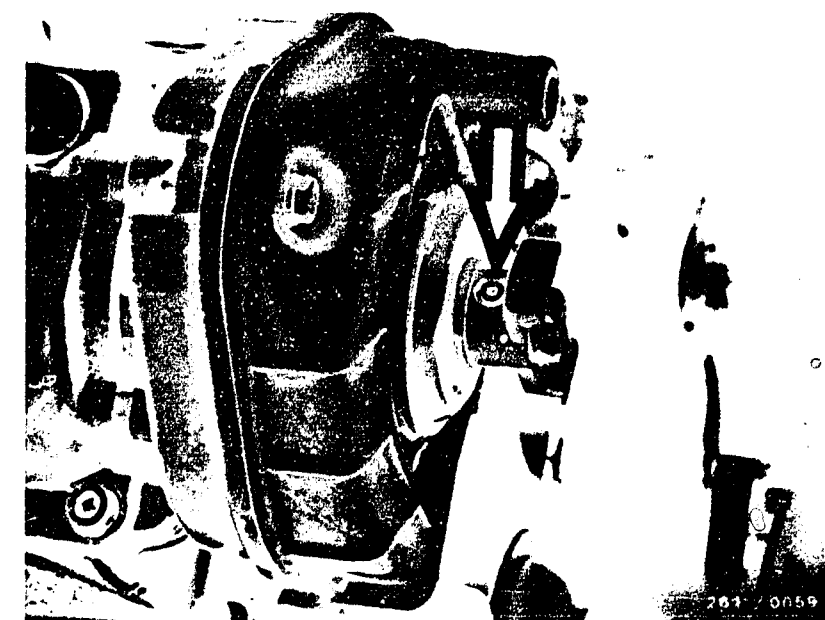


Starting motor operates, engine fails to start or starts only with great difficulty
(continued)



High-voltage distributor
1 to 4 = Cylinder numbers
ZS = High-tension cable to ignition coil
5 = Clip

Arrow = Ignition distributor rotor (screwed)



Continued on F20/21

F18

Engine fails to start
Porsche 944



F19

Engine fails to start
Porsche 944



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

yes

Solenoid-operated injection
valves O.K.?
(continued)

No

Removing the solenoid-operated injection valves

Loosen the fastening screws on the fuel-distribution pipe. Pull the fuel-distribution pipe upward until the injection valves are out of the bore in the intake manifold. Do not damage the nozzle needle or rubber seal.

Check the nozzle needle and surrounding area for leaks and deposits.

Remove the electrical connector.

Carefully slide the holding clamps out of the groove and pull the injection valve out of the fuel distribution pipe connection.

Installing the solenoid-operated injection valves

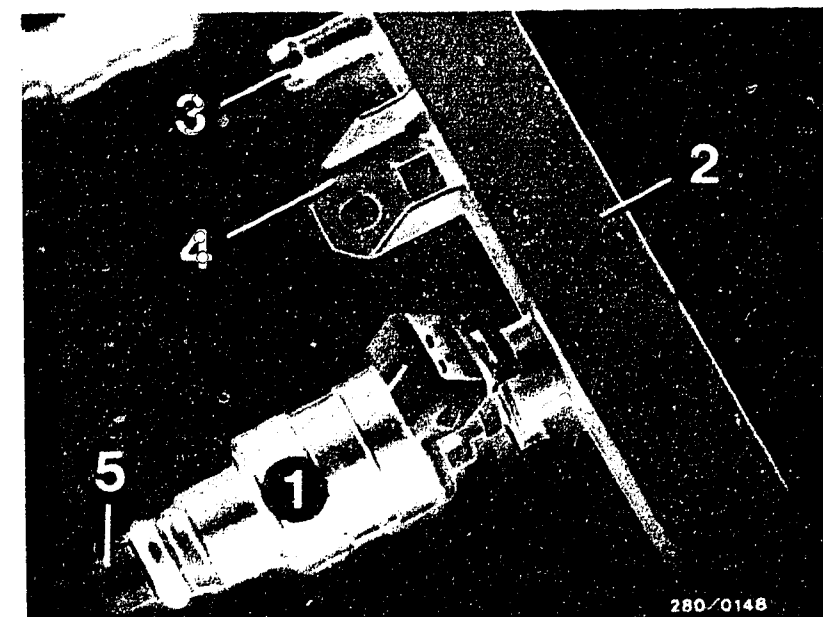
Replace the seals. Press on a new protection sleeve (contained in repair kit) so that the nozzle needle is not damaged.

Check that both rubber seals are correctly seated. Press all 4 injection valves simultaneously into their seats with the fuel-distribution pipe. Secure the fuel-distribution pipe. Check all air and fuel hoses for security. Make the electrical connections.

Start the engine and check whether any unmetered air is being drawn in.

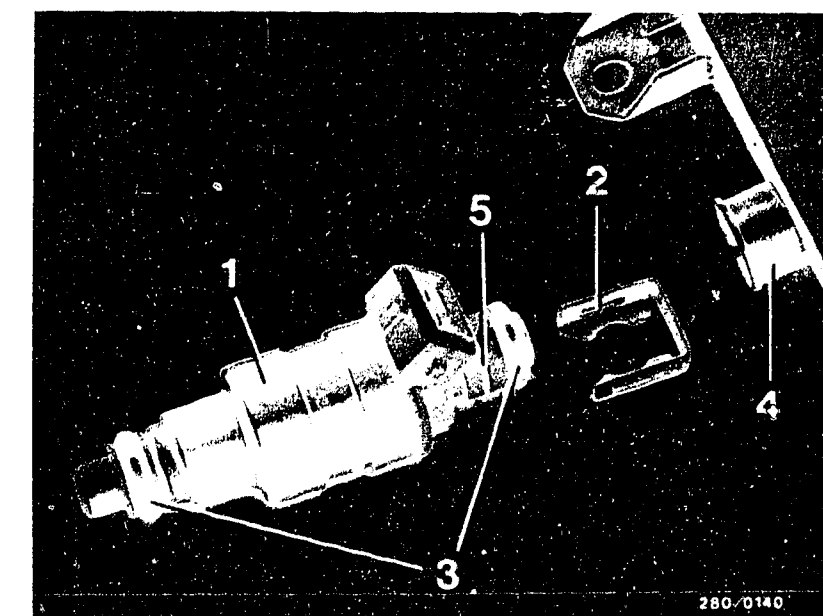
yes

Continued on F22/F23



- 1 = Solenoid-operated injection valve
- 2 = Fuel-distribution pipe
- 3 = Connection to start valve
- 4 = Mounting bracket
- 5 = Protection sleeve

- 1 = Solenoid-operated injection valve
- 2 = Holding clamp
- 3 = Rubber seal
- 4 = Fuel-distribution pipe connection
- 5 = Groove



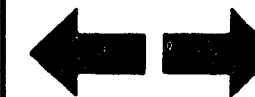
F20

Engine fails to start
Porsche 944



F21

Engine fails to start.
Porsche 944



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Yes

Auxiliary-air device tested?

No

Testing (mechanical):

1. Visual examination of auxiliary-air device:

Remove hoses and look down, using a small mirror. When cold, the device must be open; when the engine is warm, it must be closed. If not, replace auxiliary-air device.

2. Functional test of auxiliary-air device:

With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine speed must not drop. If incorrect, replace auxiliary-air device (pay attention to direction of flow).

3. Electrical test

Remove plug from auxiliary-air device. Connect ohmmeter to both terminals of the auxiliary-air device.

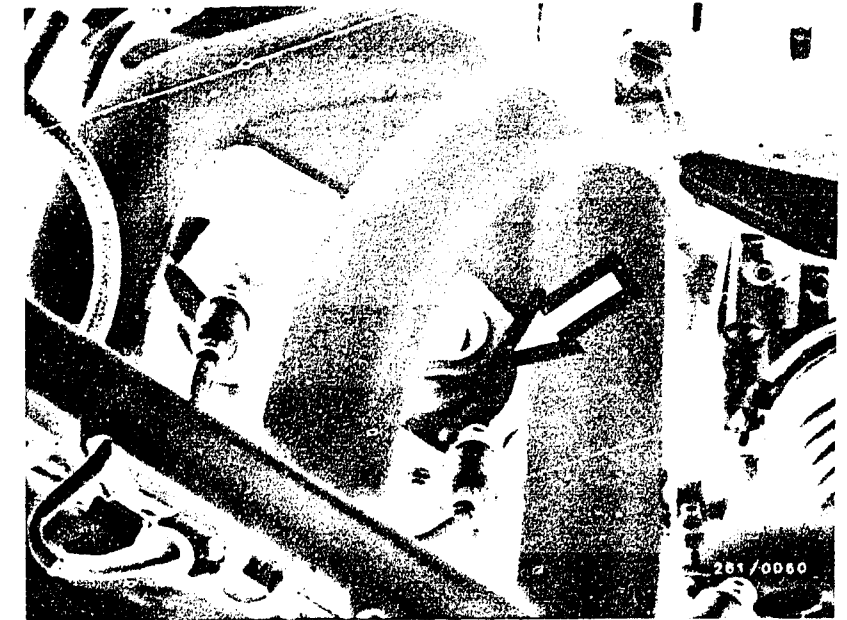
Test values:

Up till 8.82	30...65 Ω
From 8.82	20...55 Ω

If a value outside the tolerance is shown, replace the auxiliary-air device.

Yes

Continued on G1/G2



Arrow = Auxiliary-air device

F22

Engine fails to start
Porsche 944



F23

Engine fails to start
Porsche 944



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Yes

Air-flow sensor mechanically
O.K.?

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Yes

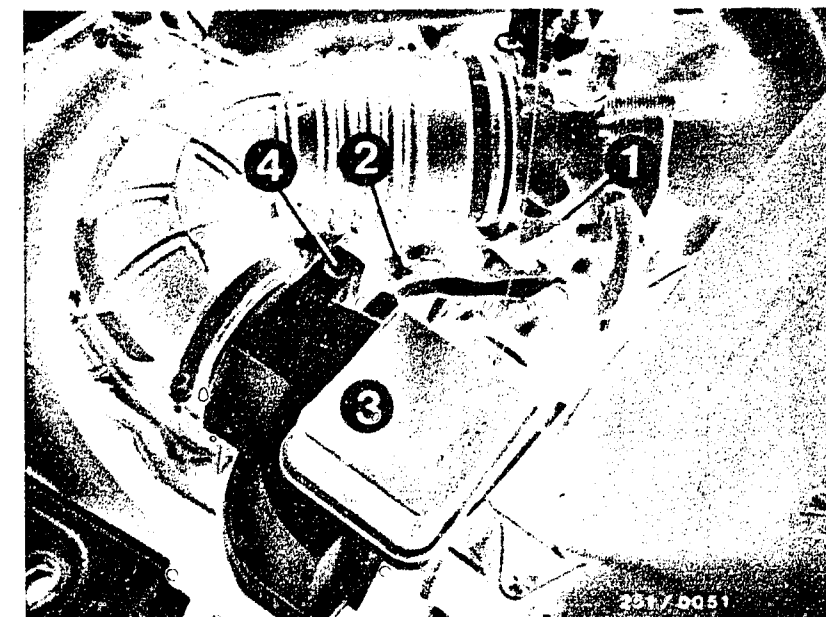
Are all hose lines and electric
leads securely attached?
Visual examination.
Is the air-intake system leak-
tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.
Checking for leaks: Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak. Check electric contacts for loose connection.

Yes

Continued on G3/G4



- 1 = Throttle-valve switch
- 2 = Engine temperature sensor (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Idle-mixture-adjusting screw

G1

Engine fails to start
Porsche 944



G2

Engine fails to start
Porsche 944



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Yes

Testing completed for customer complaint

"Starting motor operates, engine fails to start or starts only with great difficulty",

Customer complaint remedied?

No

Further possibilities

- Customer complaint incorrectly diagnosed (see Coordinates B3...B10). If the fault has not be detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

G3

Engine fails to start
Porsche 944



G4

Engine fails to start
Porsche 944



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

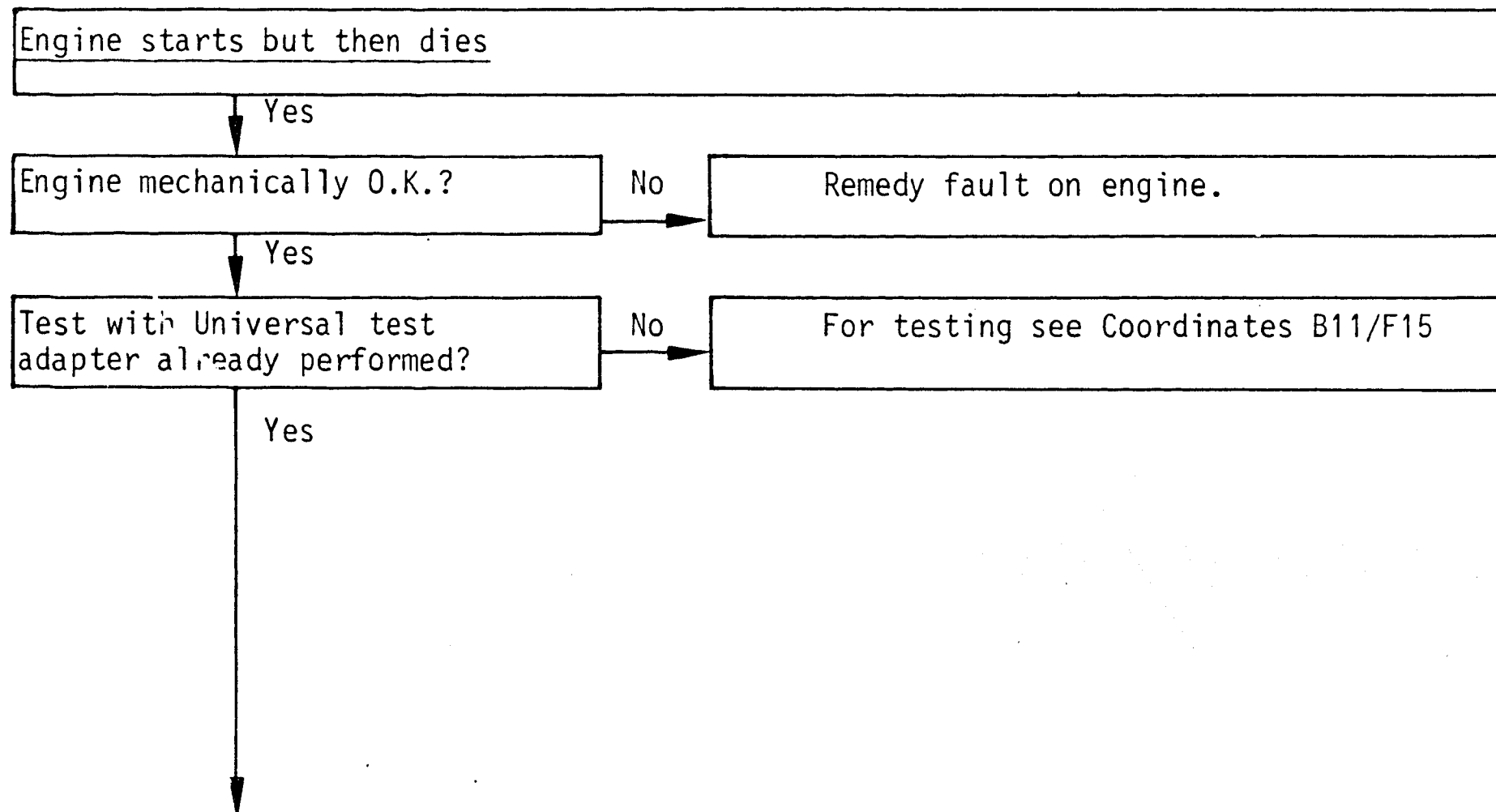
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continued trouble-shooting at the point at which you branched off.



Continued on G7/G8

G5

Engine starts but then dies
Porsche 944



G6

Engine starts but then dies
Porsche 944



Engine starts but then dies (continued)

Yes

Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.
Checking for leaks: Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak. Check electric contacts for loose connection.

Yes

Continued on G9 /G10

G7

Engine starts but then dies
Porsche 944



G8

Engine starts but then dies
Porsche 944



Engine starts but then dies (continued)

Yes

Auxiliary-air device
tested?

No

Testing (mechanical):

1. Visual examination of auxiliary-air device
Remove hoses and look down, using a small mirror.
When cold, the device must be open; when the
engine is warm, it must be closed. If not,
replace auxiliary-air device.

2. Functional test of auxiliary-air device
When engine is cold, disconnect hose to auxiliary-
air device. Engine speed must drop.
When engine is warm, disconnect hose to auxiliary-
air device. Engine speed must not drop.
If not replace auxiliary-air device (observe
direction of flow).

3. Electrical test

Disconnect plug of auxiliary-air device.
Connect ohmmeter to both terminals of the
auxiliary-air device.

Test values

Up till 8.82	30...65 Ω
From 8.82	20...55 Ω

If a value outside tolerance is shown, replace
auxiliary-air device.

Yes



Arrow = Auxiliary-air device

Continued on G11/G12

G9

Engine starts but then dies
Porsche 944



G10

Engine starts but then dies
Porsche 944



Engine starts but then dies (continued)

Yes

Start valve O.K.?
(Continued)

No

Testing the start valve for leaks:

1. When installed:

Pinch off the fuel delivery line at the start valve. If engine then runs smoothly, replace start valve.

2. When removed:

Remove the start valve (caution! fire hazard!). Fuel line and electric lead remain connected. (Place collector vessel under the start valve). Build up the fuel pressure.

Test specification: Within one minute max.
1 drop may form at the mouth of the valve.

Yes

Testing completed for
customer complaint

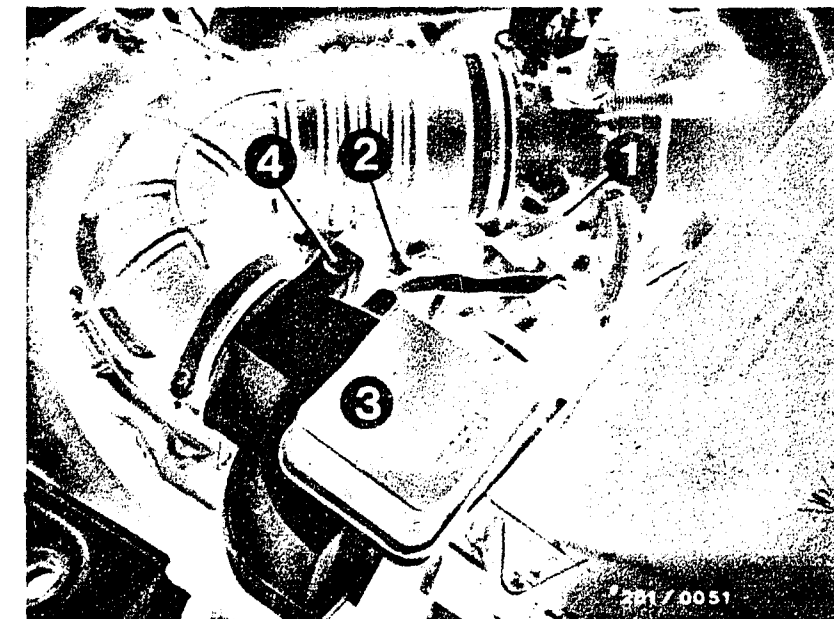
"Engine starts but then
dies".

Customer complaint
remedied?

No

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B10).
If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



- 1 = Throttle-valve switch
- 2 = Engine temperature sensor (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Idle-mixture-adjusting screw

G11

Engine starts but then dies
Porsche 944



G12

Engine starts but then dies
Porsche 944



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

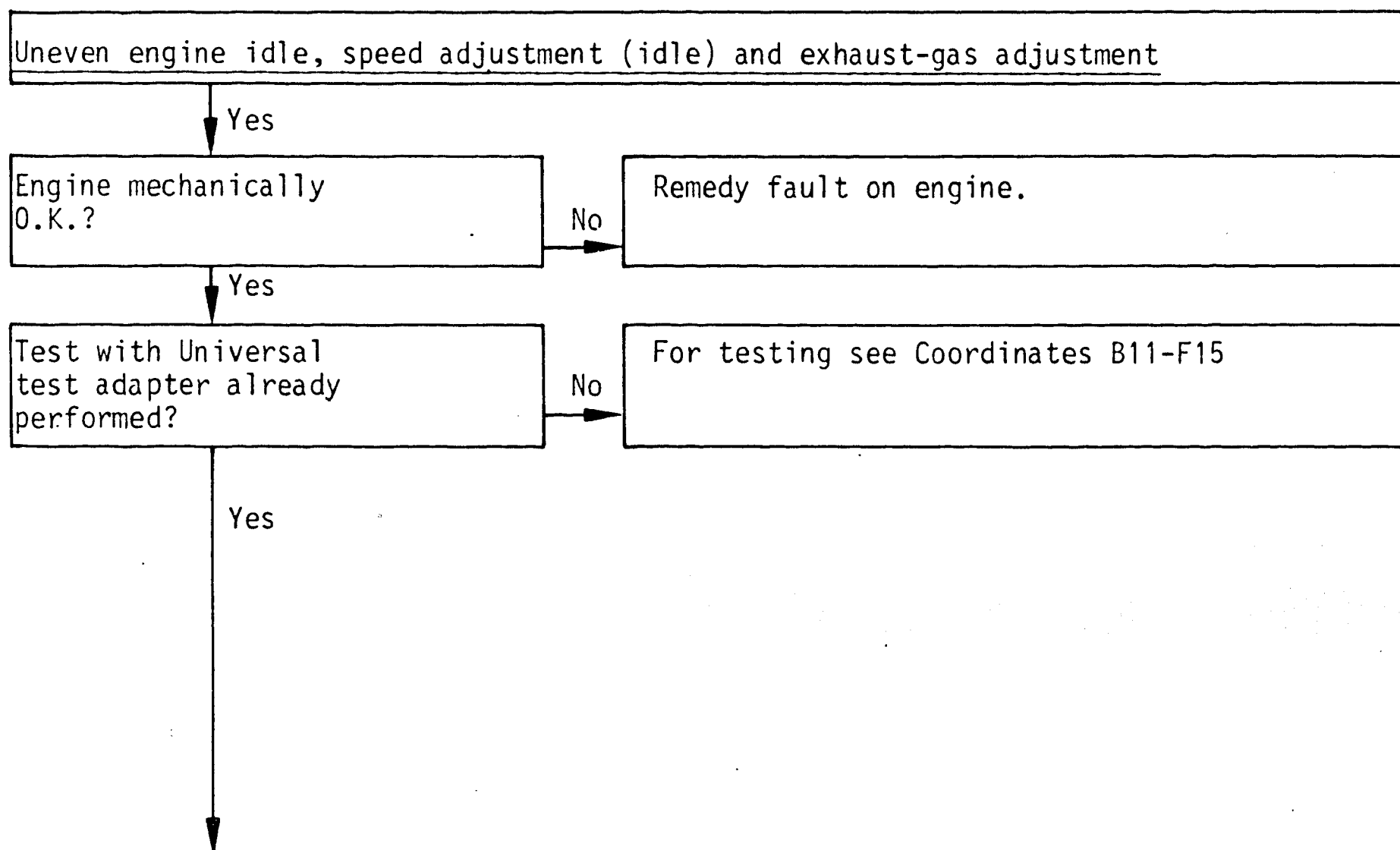
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on G15/G16

G13

Uneven engine idle
Porsche 944

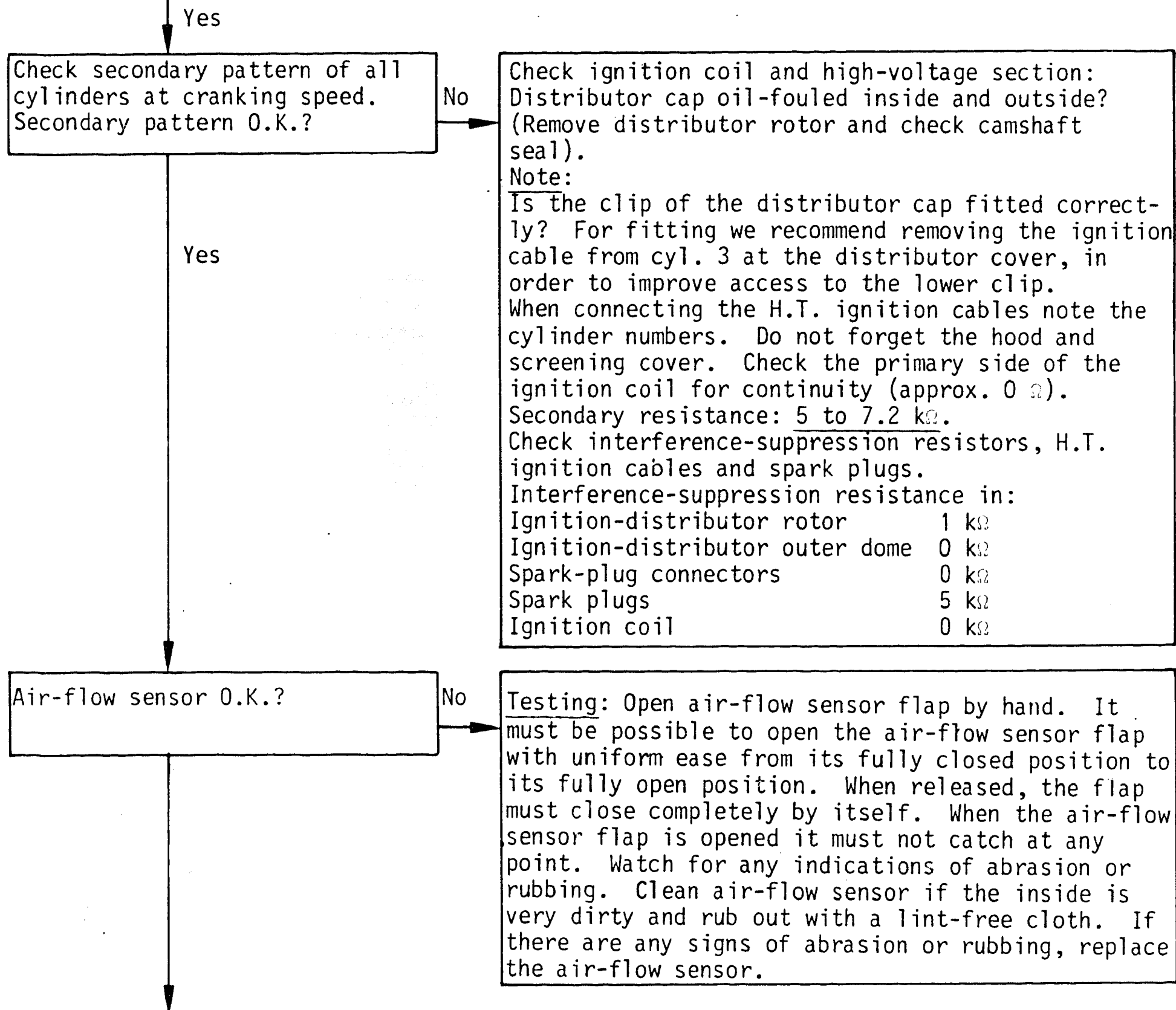


G14

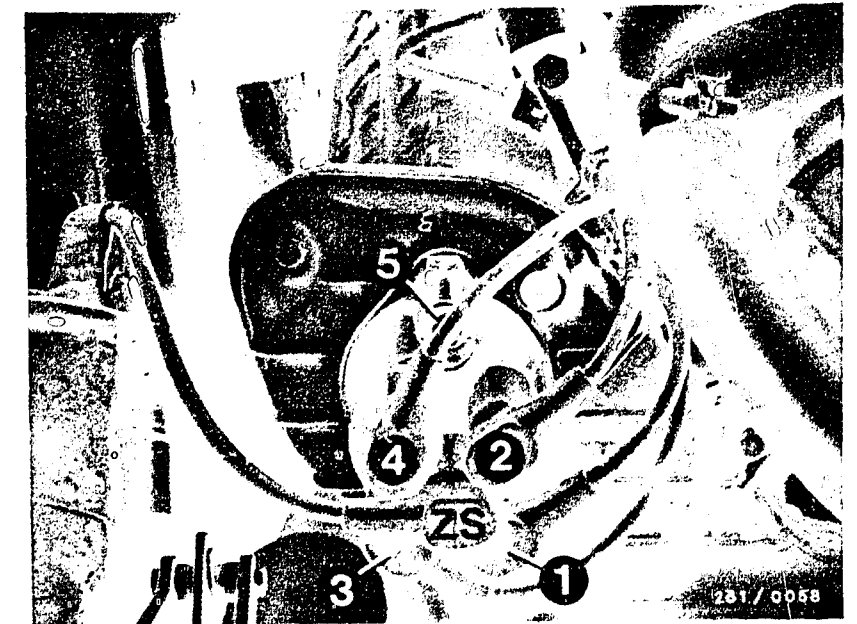
Uneven engine idle
Porsche 944



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment
(continued)

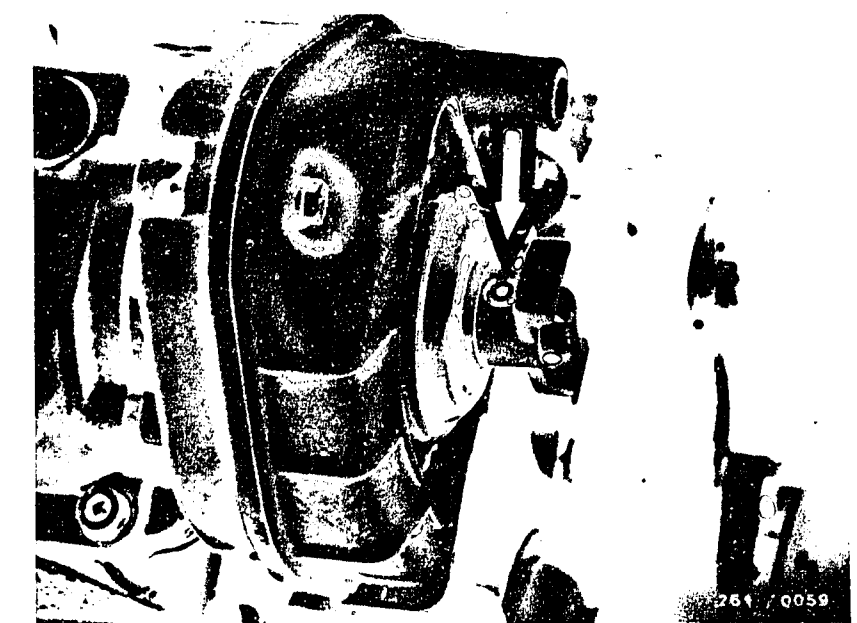


Continued on G17/G18



- 1 to 4 = Cylinder numbers
ZS = High-tension cable to ignition coil
5 = Clip

Arrow = Ignition-distributor rotor (screwed)



G 15

Uneven engine idle
Porsche 944



G 16

Uneven engine idle
Porsche 944



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

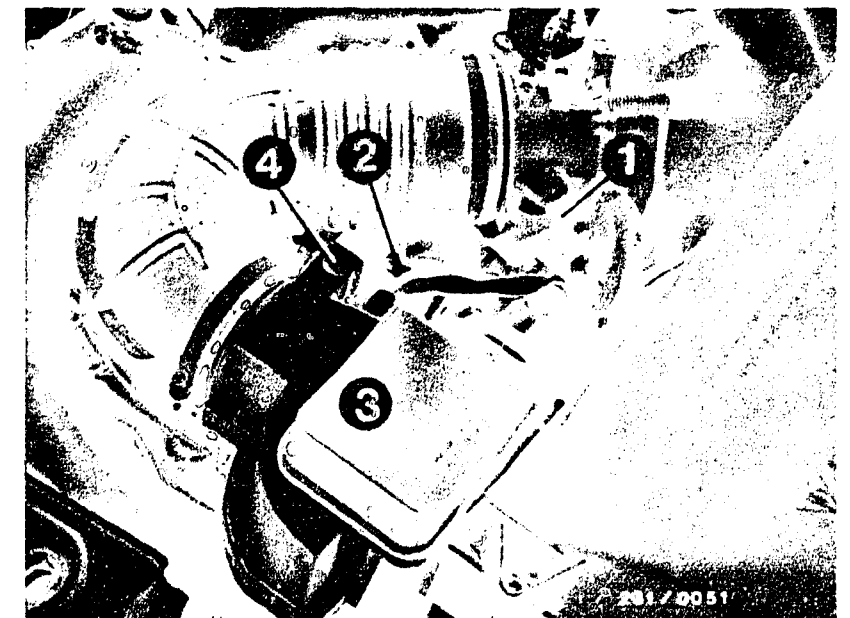
Yes

Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.
Checking for leaks: Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device. and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak. Check electric contacts for loose connection.

Yes



- 1 = Throttle-valve switch
- 2 = Temperature sensor engine (NTC II)
- 3 = Air-flow sensor with NTC 1
- 4 = Mixture-adjustment screw

Continued on G19/G20

G17

Uneven engine idle
Porsche 944



G18

Uneven engine idle
Porsche 944



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

Yes

Auxiliary-air device
tested?

No

Testing (mechanical):

1. Visual examination of auxiliary-air device:
Remove hoses and look down, using a small mirror.
When cold, the device must be open when the
engine is warm, it must be closed. If not,
replace auxiliary-air device.

2. Functional test of auxiliary-air device:
With the engine cold, pinch off hose to
auxiliary-air device. Engine speed must drop.
With the engine warm, pinch off hose to
auxiliary-air device. Engine speed must not drop.
If incorrect, replace auxiliary-air device (pay
attention to direction of flow).

3. Electrical test

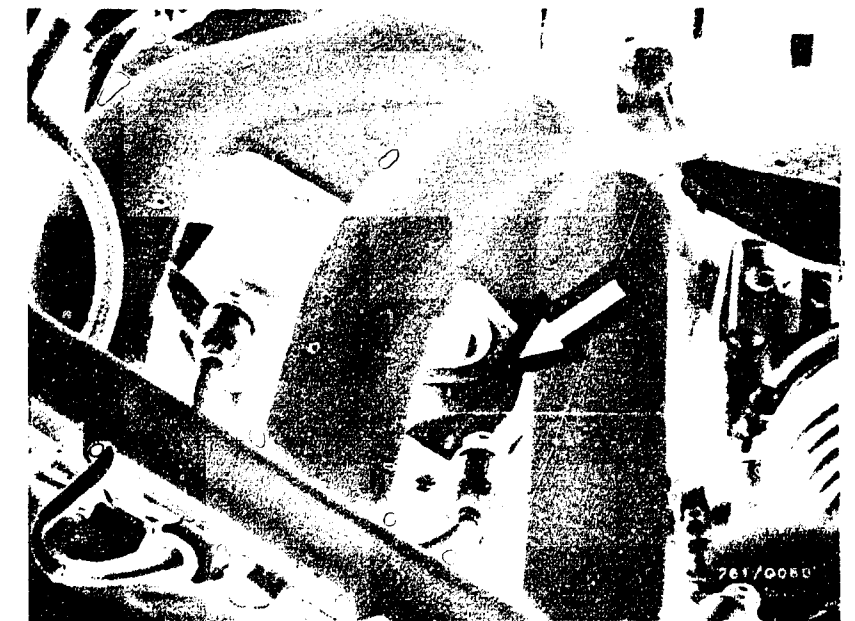
Disconnect plug of auxiliary-air device. Connect
ohmmeter to both terminals of the auxiliary-air
device.

Test values

Up till 8.82	<u>30...65 Ω</u>
From 8.82	<u>20...55 Ω</u>

If a value outside the tolerance is shown, replace
the auxiliary-air device.

Yes



Arrow = Auxiliary-air device

Continued on G21/G22

G 19

Uneven engine idle
Porsche 944



G 20

Uneven engine idle
Porsche 944



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

yes

Solenoid-operated injection valve mechanically O.K.?

No

With the engine running, disconnect the injection valve connectors individually, one after the other, from the injection valves and plug on again. Engine speed must drop if injection valve is O.K.. If not, replace injection valve.

Removing the solenoid-operated injection valves

Loosen the fastening screws on the fuel-distribution pipe. Pull the fuel-distribution pipe upward until the injection valves are out of the bore in the intake manifold. Do not damage the nozzle needle or rubber seal.

Check the nozzle needle and surrounding area for leaks and deposits.

Remove the electrical connector.

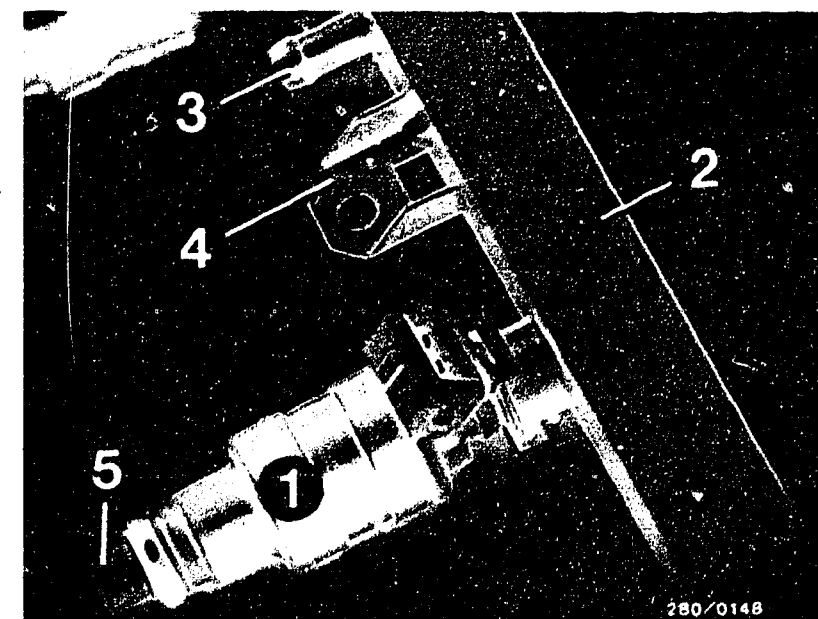
Carefully slide the holding clamps out of the groove and pull the injection valve out of the fuel distribution pipe connection.

Installing the solenoid-operated injection valves

Replace the seals. Press on a new protection sleeve (contained in repair kit) so that the nozzle needle is not damaged.

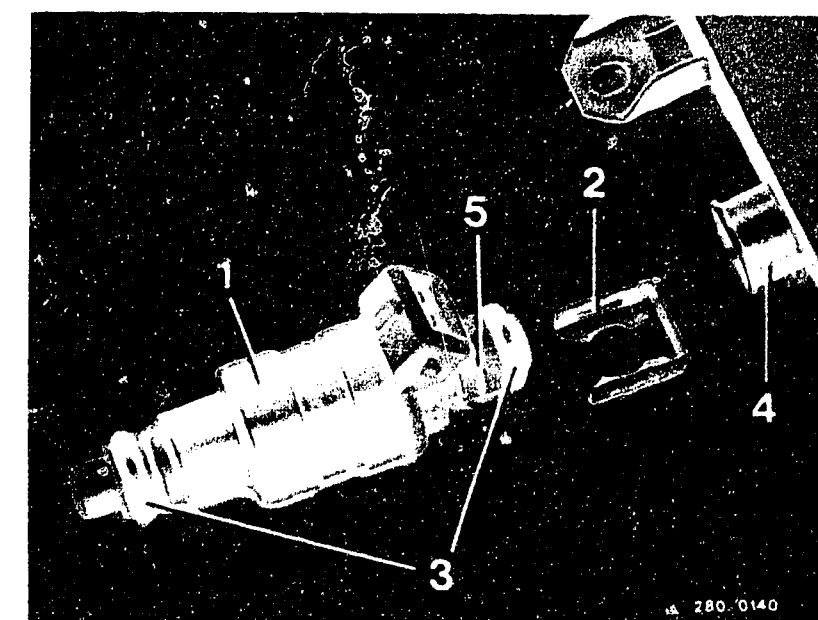
Check that both rubber seals are correctly seated. Press all 4 injection valves simultaneously into their seats with the fuel-distribution pipe. Secure the fuel-distribution pipe. Check all air and fuel hoses for security. Make the electrical connections.

Start the engine and check whether any unmetered air is being drawn in.



- 1 = Solenoid-operated injection valve
- 2 = Fuel-distribution pipe
- 3 = Connection to start valve
- 4 = Mounting bracket
- 5 = Protection sleeve

- 1 = Solenoid-operated injection valve
- 2 = Holding clamp
- 3 = Rubber seal
- 4 = Fuel distribution pipe connection
- 5 = Groove



Continued on G23/G24

G21

Uneven engine idle
Porsche 944

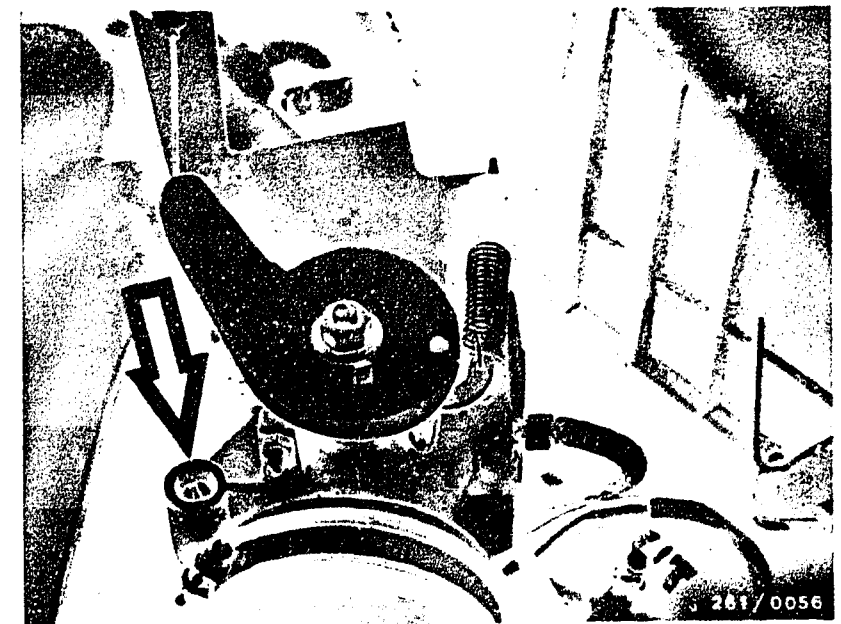
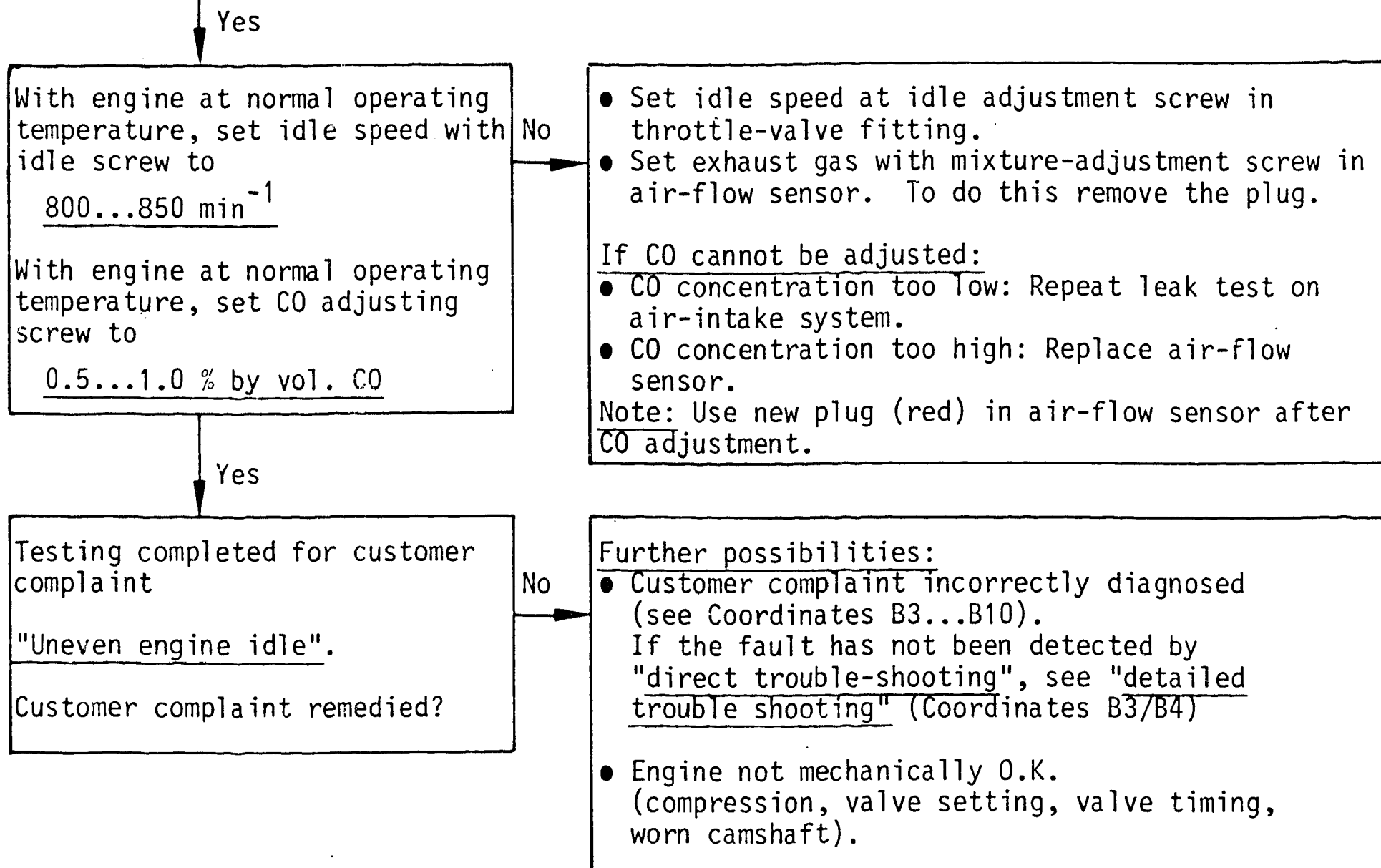


G22

Uneven engine idle
Porsche 944

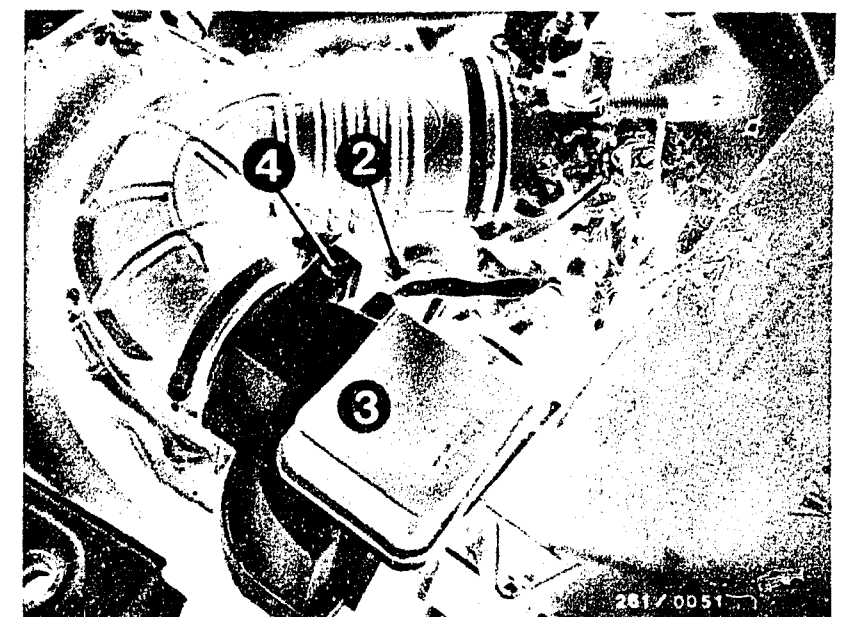


Uneven engine idle, speed adjustment (idle) and exhaust-gas test (continued)



Arrow = Idle-speed adjusting screw

- 1 = Throttle-valve switch
- 2 = Temperature sensor engine (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Mixture-adjustment screw



G23

Uneven engine idle
Porsche 944



G24

Uneven engine idle
Porsche 944



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

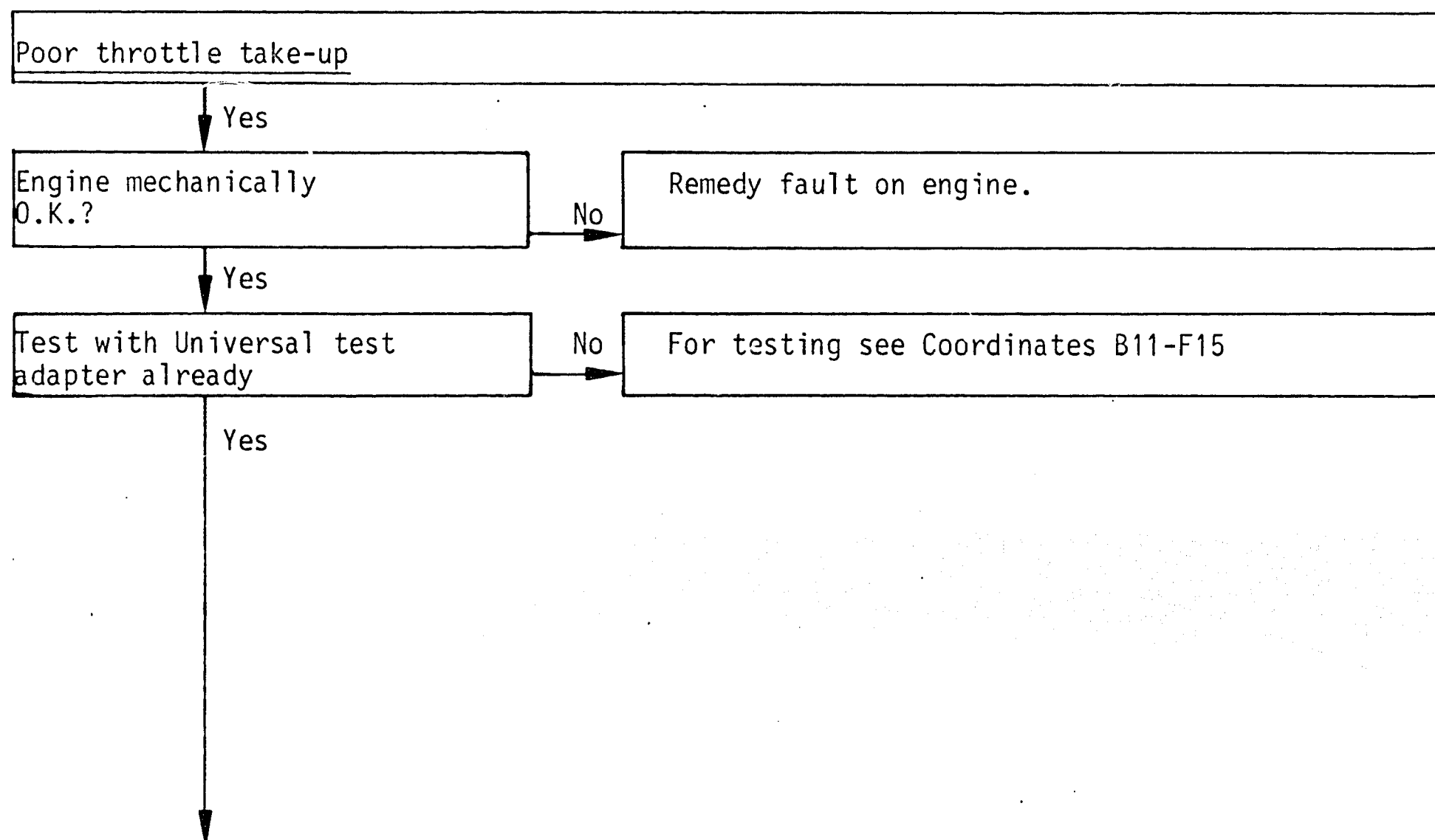
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on H3/H4

H1

Poor throttle take-up
Porsche 944



H2

Poor throttle take-up
Porsche 944



Poor throttle take-up (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage section: Distributor cap oil-fouled inside and outside? (Remove distributor rotor and check camshaft seal).

Note:

Is the clip of the distributor cap fitted correctly? For fitting, we recommend removing the ignition cable from cyl. 3 at the distributor cover, in order to improve access to the clip. When connecting the H.T. ignition cables note the cylinder numbers. Do not forget the hood and screening cover. Check the primary side of the ignition coil for continuity (approx. 0Ω).

Secondary resistance: 5 to 7.2 k Ω .

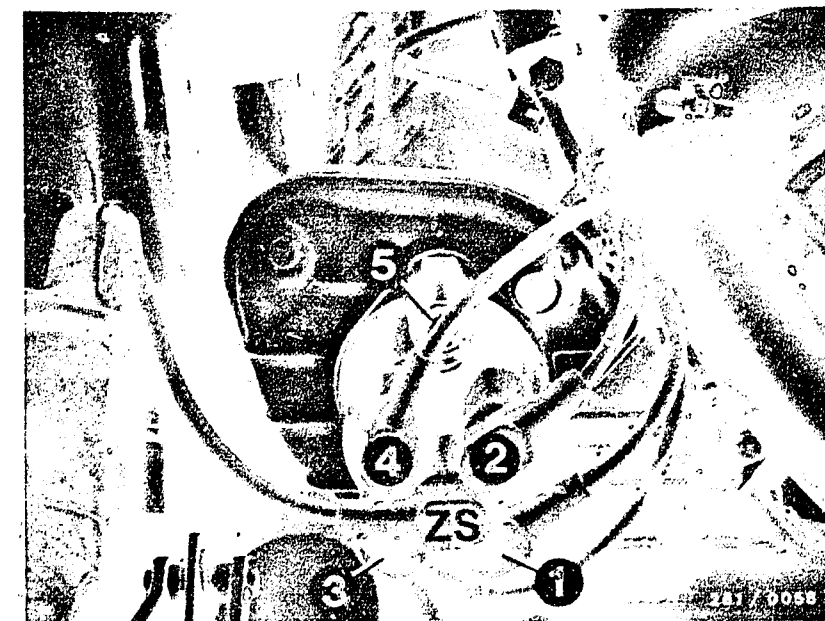
Check interference-suppression resistors. H.T. ignition cables and spark plugs.

Interference-suppression resistance in:

ignition-distributor rotor	1 k Ω
ignition-distributor outer dome	1 k Ω
ignition-distributor center dome	1 k Ω
spark-plug connectors	3 k Ω
spark plugs	approx. 5 k Ω
ignition coil	0 k Ω

Yes

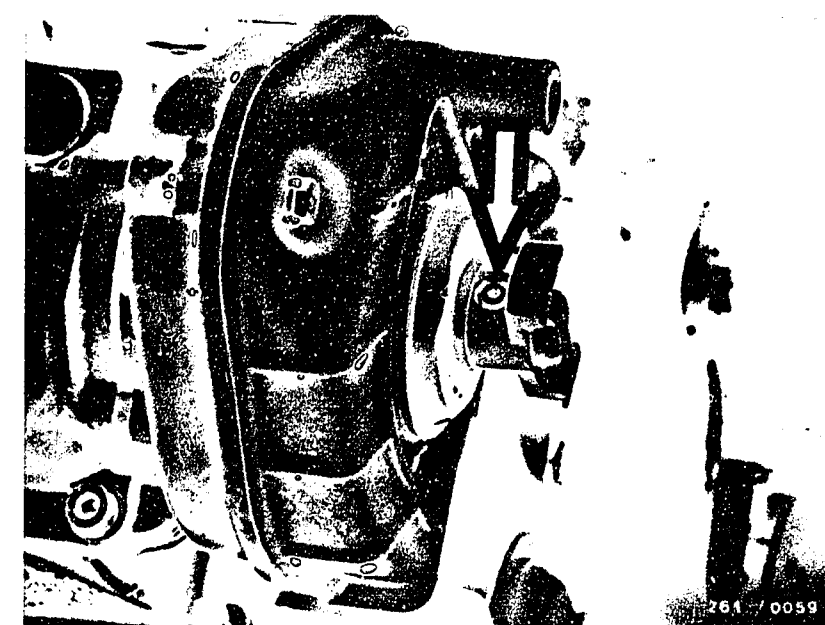
Continued on H5/H6



High-voltage distributor

- 1 to 4 = Cylinder numbers
- ZS = High-tension cable to ignition coil
- 5 = Clip

Arrow = Ignition distributor rotor (screwed)



H3

Poor throttle take-up
Porsche 944



H4

Poor throttle take-up
Porsche 944



Poor throttle take-up (continued)

Yes

Air-flow sensor mechanically O.K.?

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Yes

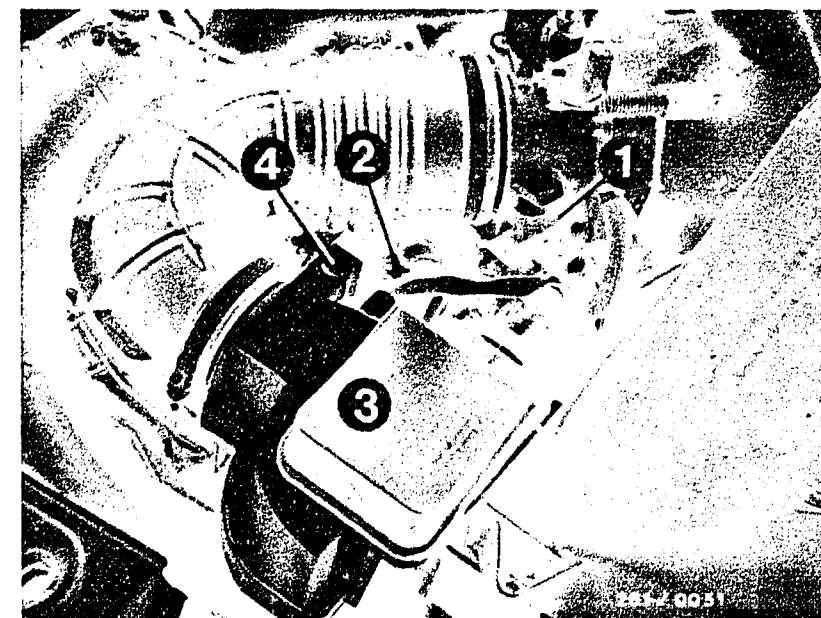
Are all hose lines and electric leads securely attached?
Visual examination
Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.
Checking for leaks: Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak. Check electric contacts for loose connection.

Yes

Continued on H7/H8



- 1 = Throttle-valve switch
- 2 = Temperature sensor engine (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Mixture-adjustment screw

H5

Poor throttle take-up
Porsche 944



H6

Poor throttle take-up
Porsche 944



Poor throttle take-up (continued)

Yes

Auxiliary-air device tested?

No

Testing (mechanical):

1. Visual examination of auxiliary-air device:
Remove hoses and look down, using a small mirror. When cold, the device must be open; when the engine is warm it must be closed. If not, replace auxiliary-air device.

2. Functional test of auxiliary-air device:
With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine speed must not drop. If incorrect, replace auxiliary-air device (pay attention to direction of flow).

3. Electrical test

Disconnect the plug of the auxiliary-air device. Connect ohmmeter to both terminals of the auxiliary-air device.

Test values

Up till 8.82	<u>30...65Ω</u>
From 8.82	<u>20...55Ω</u>

If a value outside the tolerance is shown, replace the auxiliary-air device.

Yes

Continued on H9/H10



Arrow = Auxiliary-air device

H7

Poor throttle take-up
Porsche 944



H8

Poor throttle take-up
Porsche 944



Poor throttle take-up (continued)

Yes

Testing completed for customer complaint

"Poor throttle take-up"

Customer complaint remedied?

No

Further possibilities:

- Customer complaint incorrectly diagnosed (See Coordinates B3...B10).
If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

H9

Poor throttle take-up
Porsche 944



H10

Poor throttle take-up
Porsche 944



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

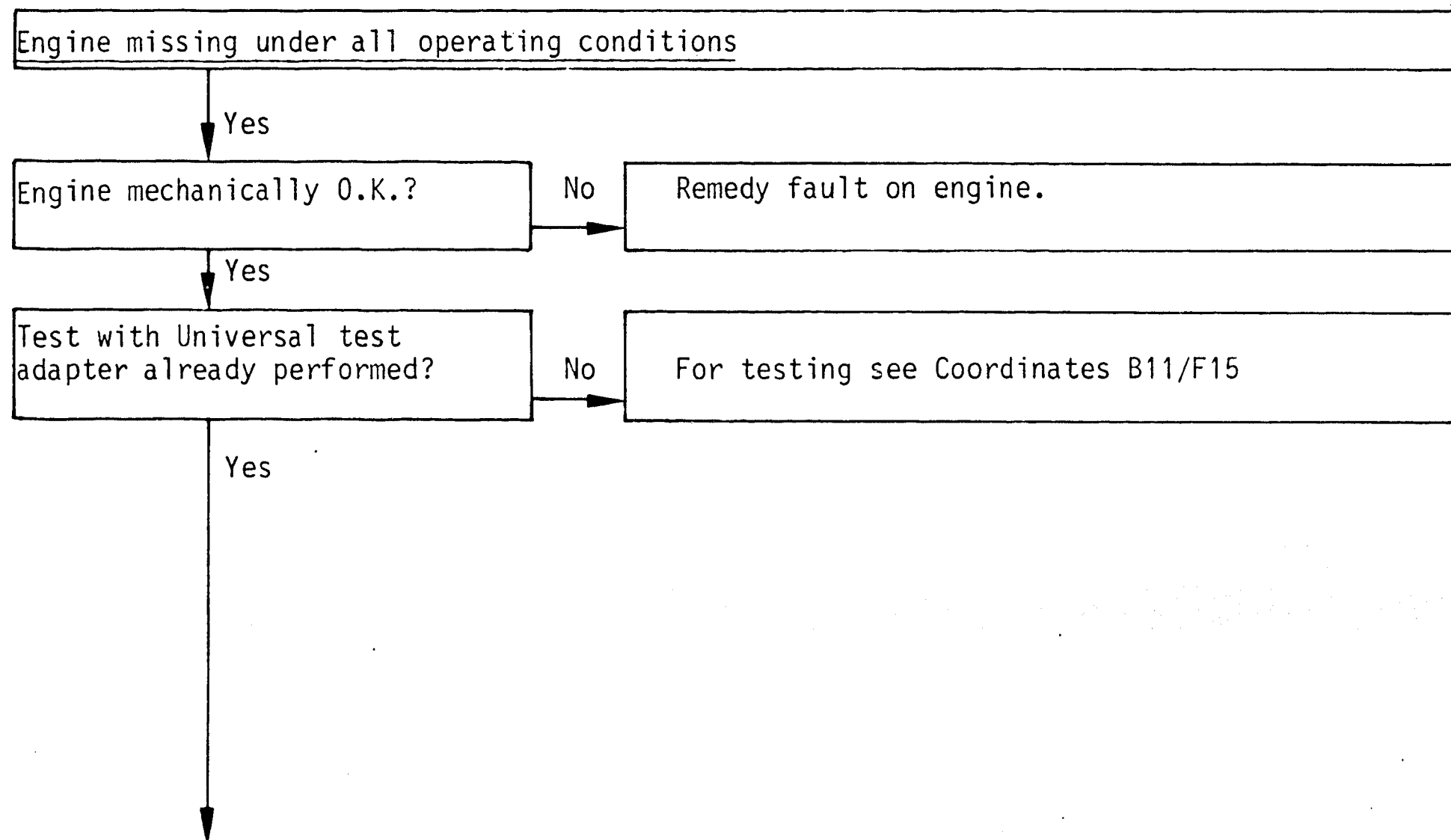
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on H13/H14

H11

Engine missing
Porsche 944



H12

Engine missing
Porsche 944



Engine missing under all operating conditions (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage section: Distributor cap oil-fouled inside and outside? (Remove distributor rotor and check camshaft seal).
 Note: Is the clip of the distributor cap fitted correctly? For fitting, we recommend removing the ignition cable from cyl. 3 at the distributor cover, in order to improve access to the lower clip.
 When connecting the H.T. ignition cables note the cylinder numbers. Do not forget the hood and screening cover. Check the primary side of the ignition coil for continuity (approx. 0 Ω). Secondary resistance: 5 to 7.2 k Ω . Check interference-suppression resistors, H.T. ignition cables and spark plugs.
 Interference-suppression resistance in:

ignition-distributor rotor	1 k Ω
ignition-distributor outer dome	1 k Ω
ignition-distributor center dome	1 k Ω
spark-plug connectors	3 k Ω
spark plugs	approx. 5 k Ω
ignition coil	0 k Ω

Yes

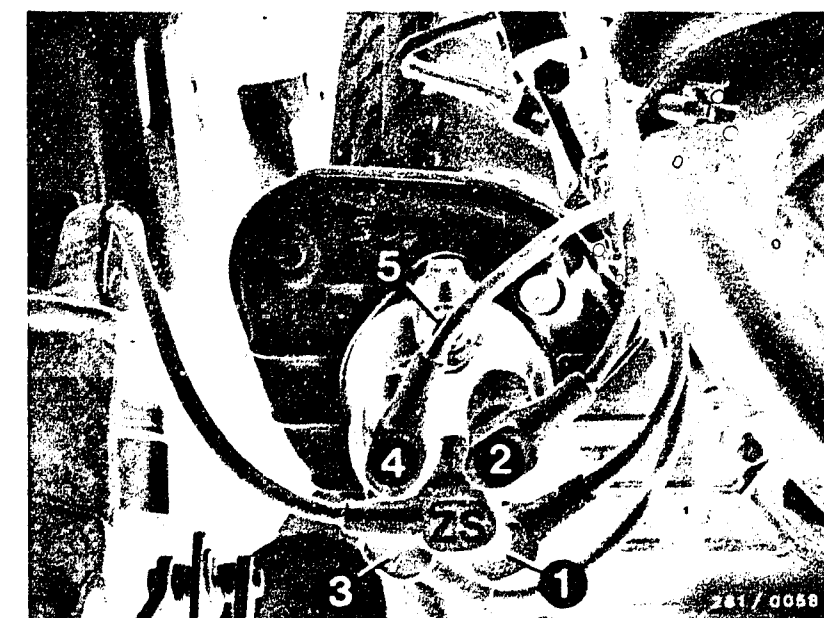
Plug-in connections of wiring harness and ground terminal O.K.?

No

Look for engine missing due to loose contacts as follows: Let the engine run, if possible on a chassis dynamometer. Keep the engine speed constant and watch for engine missing. Move the wiring harness and plug-in connections while doing this. Watch particularly for plug-in connections on engine-speed and reference-mark sensors. Ground terminal firmly secured? Check plug-in connections for security and corrosion. Spring contacts must be clipped in and must not move back. Check ground leads for continuity and loose contacts.

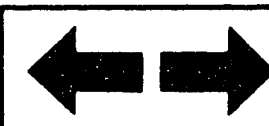
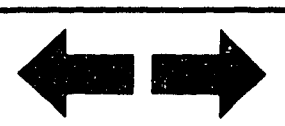
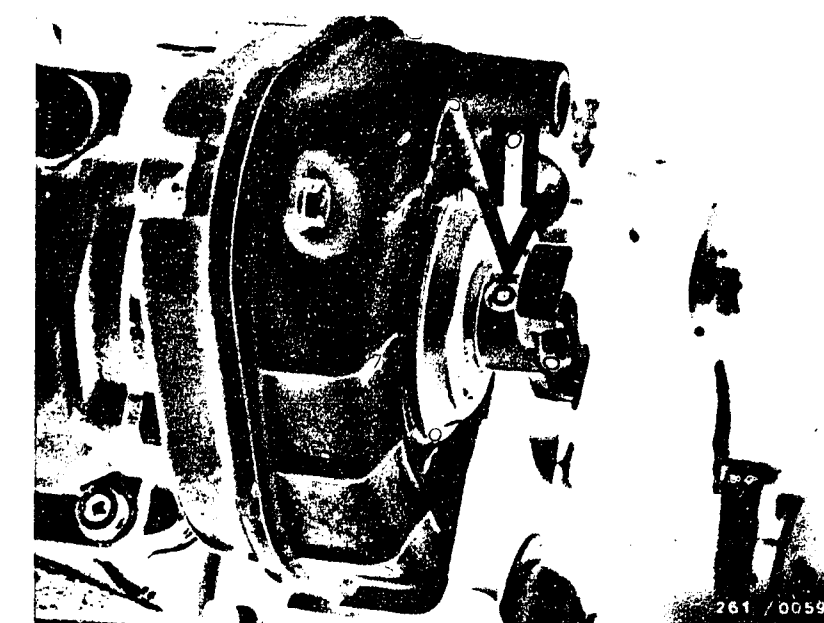
Yes

Continued on H15/H16

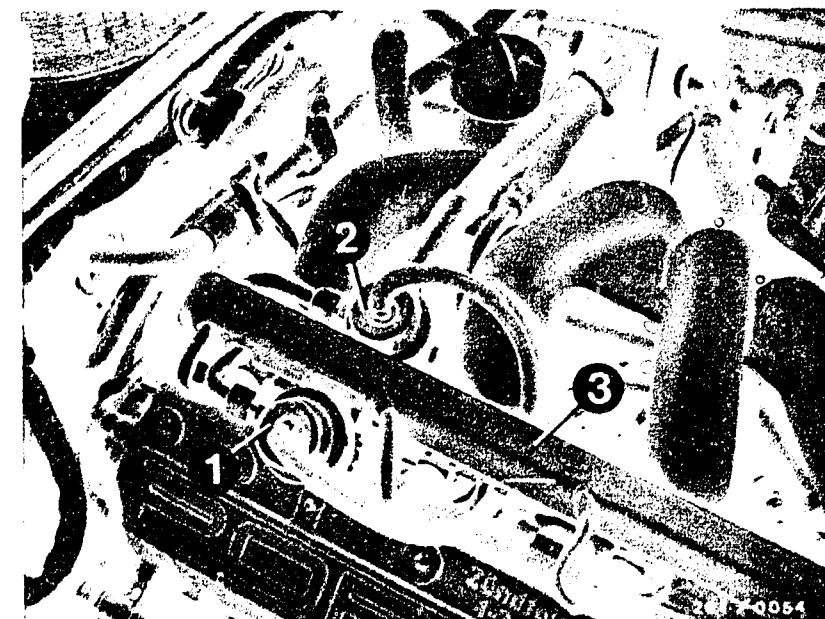
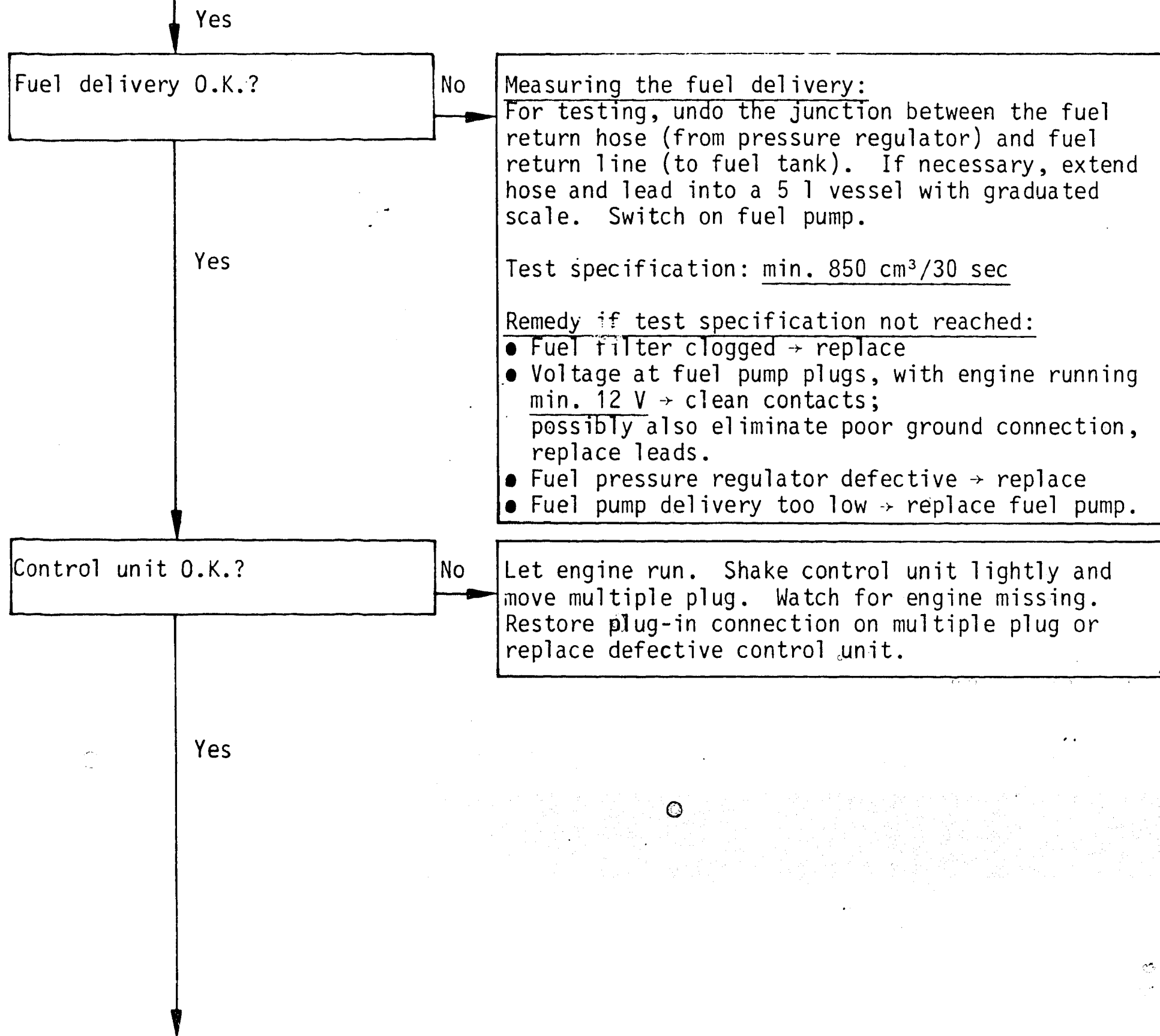


High-voltage distributor
 1 to 4 = Cylinder numbers
 ZS = High-tension cable to ignition coil
 5 = Clip

Arrow = Ignition-distributor rotor (screwed)

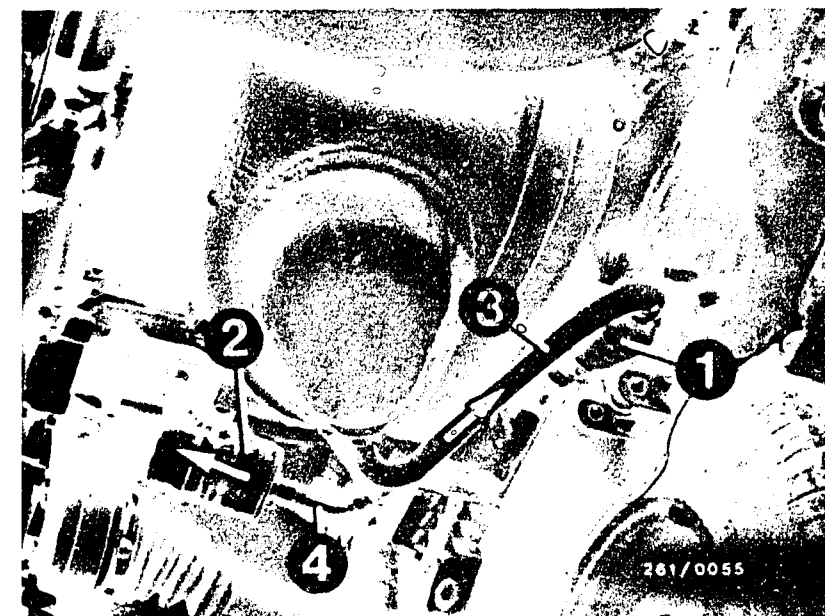


Engine missing under all operating conditions (continued)



- 1 = Pressure regulator
2 = Fuel-line-pressure damper
3 = Fuel-distributor pipe
4 = Air hose to intake manifold
5 = Return hose

- 1 = Pressure regulator
2 = Fuel filter
3 = Fuel suction line
4 = Fuel pressure line
Arrow = Fuel-flow direction



Continued on H17/H18



Engine missing under all operating conditions (continued)

Yes

Air-flow sensor O.K.?

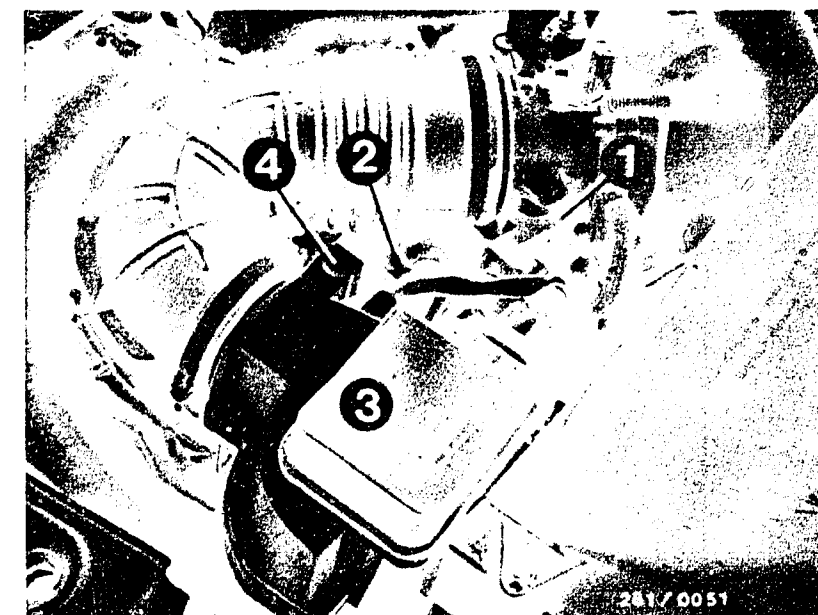
No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Potentiometer test (noise test)

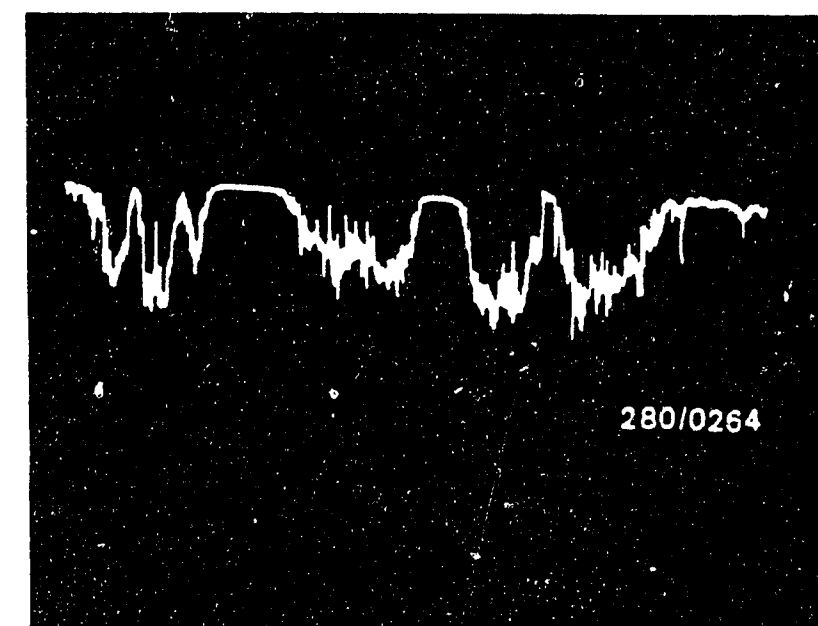
Remove air-flow sensor. Leave plug on. Set motortester to special input and connect using special cable to air-flow sensor term. 7 (red clip) and term. 6 (black clip). Set control stick for image adjustment on motortester as far as it will go to the left (calibrated setting). Deflect air-flow sensor flap suddenly (several times). If noise signal incorrect (see illustration) replace air-flow sensor.

Yes



- 1 = Throttle-valve switch
- 2 = Temperature sensor engine (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Mixture-adjustment screw

Incorrect noise signal



280/0264

Continued on H19/H20

H17

Engine missing
Porsche 944

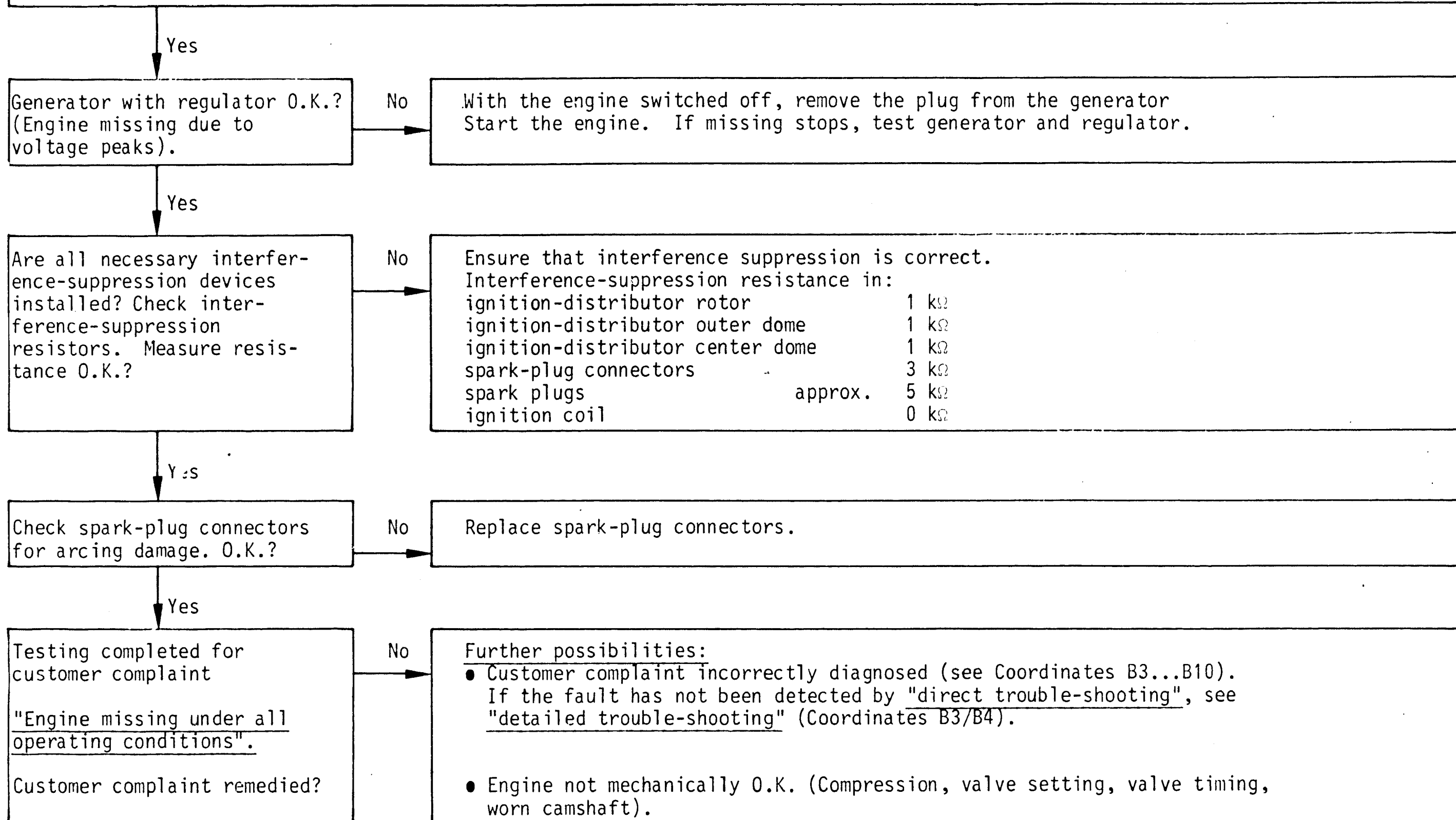


H18

Engine missing
Porsche 944



Engine missing under all operating conditions (continued)



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

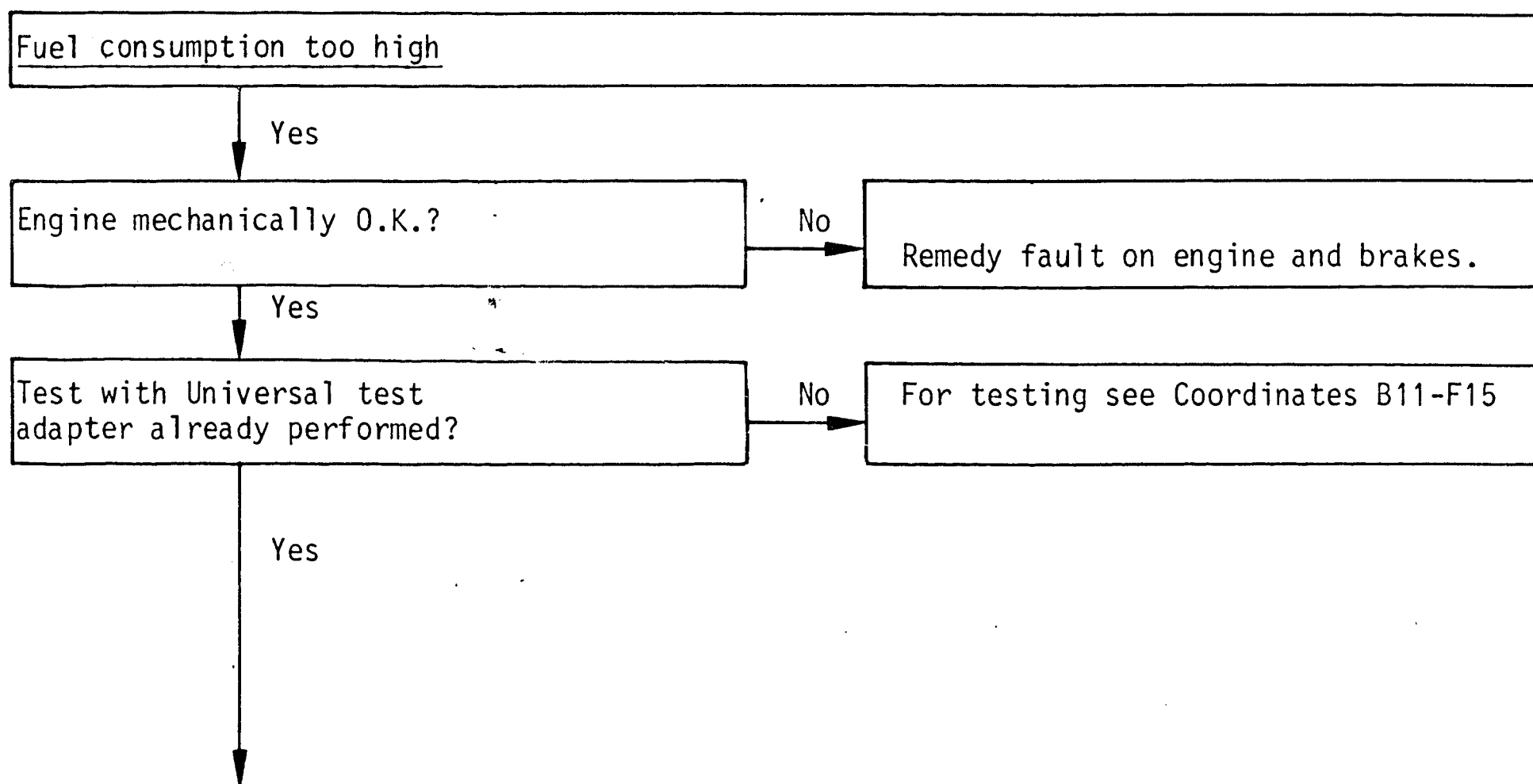
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

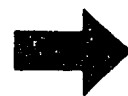
When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on H23/H24

H21

Fuel consumption too high
Porsche 944



H22

Fuel consumption too high
Porsche 944



Fuel consumption too high (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage section: Distributor cap oil-fouled inside and outside? (Remove distributor rotor and check camshaft seal).

Note:

Is the clip of the distributor cap fitted correctly? For fitting, we recommend removing the ignition cable from cyl. 3 at the distributor cover in order to improve access to the lower clip. When connecting the H.T. ignition cables note the cylinder numbers. Do not forget the hood and screening cover. Check the primary side of the ignition coil for continuity (approx. 0Ω).

Secondary resistance: 5 to 7.2 $k\Omega$. Check interference-suppression resistors, H.T. ignition cables and spark plugs.

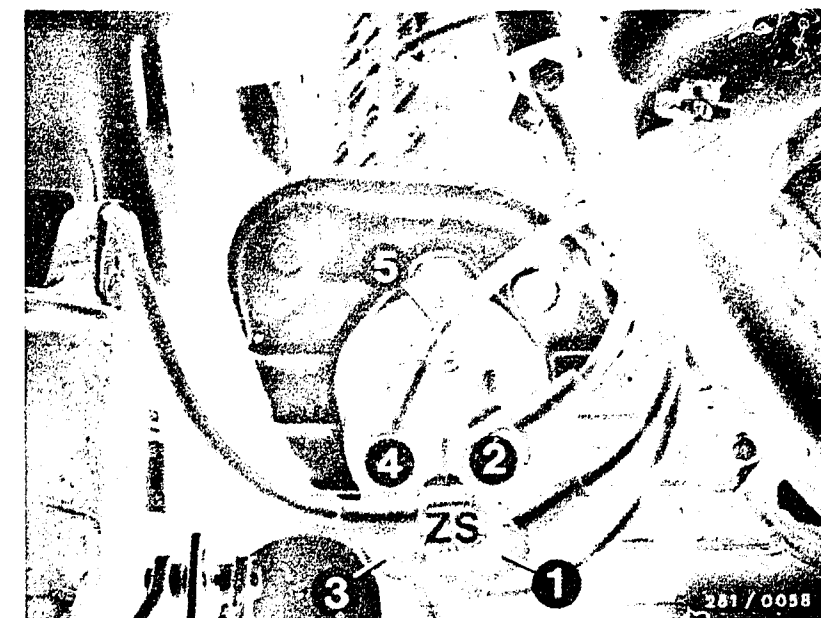
Interference-suppression resistance in:

ignition-distributor rotor	1 $k\Omega$
ignition-distributor outer dome	1 $k\Omega$
ignition-distributor center dome	1 $k\Omega$
spark-plug connectors	3 $k\Omega$
spark plugs	approx. 5 $k\Omega$
ignition coil	0 $k\Omega$

Yes

Yes

Continued on J1/J2



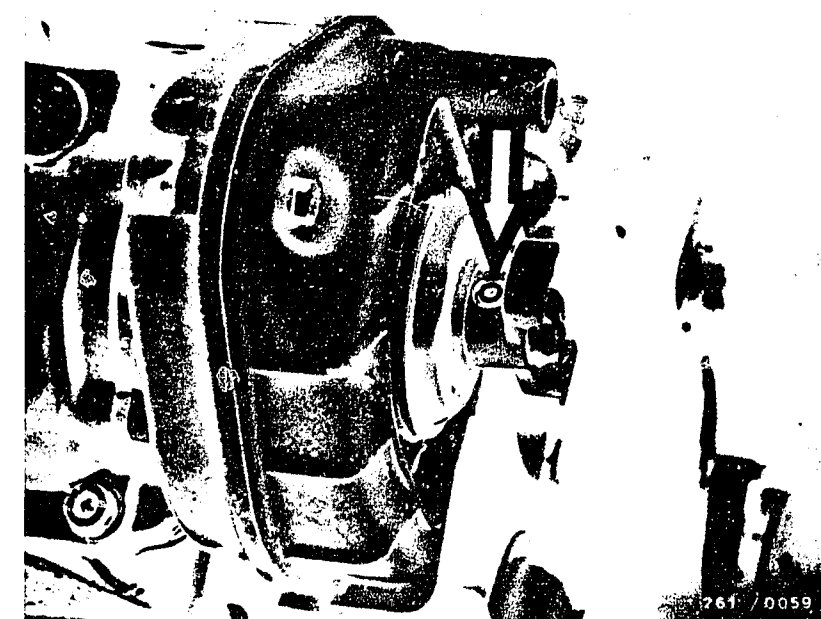
High-voltage distributor

1 to 4 = Cylinder numbers

ZS = High-tension cable to ignition coil

5 = Clip

Arrow = Ignition-distributor rotor (screwed)



H23

Fuel consumption too high

Porsche 944



H24

Fuel consumption too high

Porsche 944



Fuel consumption too high (continued)

Yes

Air-flow sensor O.K.?

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Yes

Testing completed for customer complaint

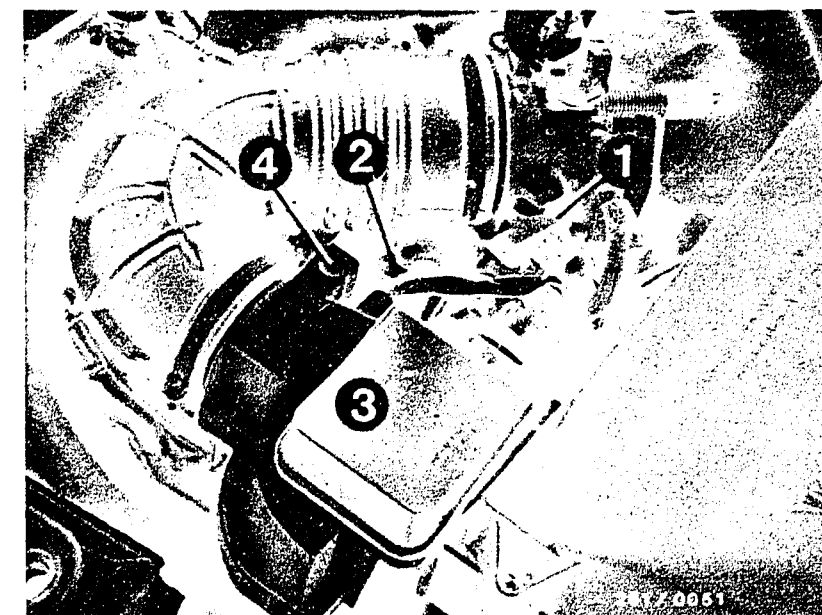
"Fuel consumption too high".

Customer complaint remedied?

No

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B10). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



- 1 = Throttle-valve switch
2 = Temperature sensor (NTC II)
3 = Air-flow sensor with NTC I
4 = Mixture-adjustment screw

J1

Fuel consumption too high
Porsche 944



J2

Fuel consumption too high
Porsche 944



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

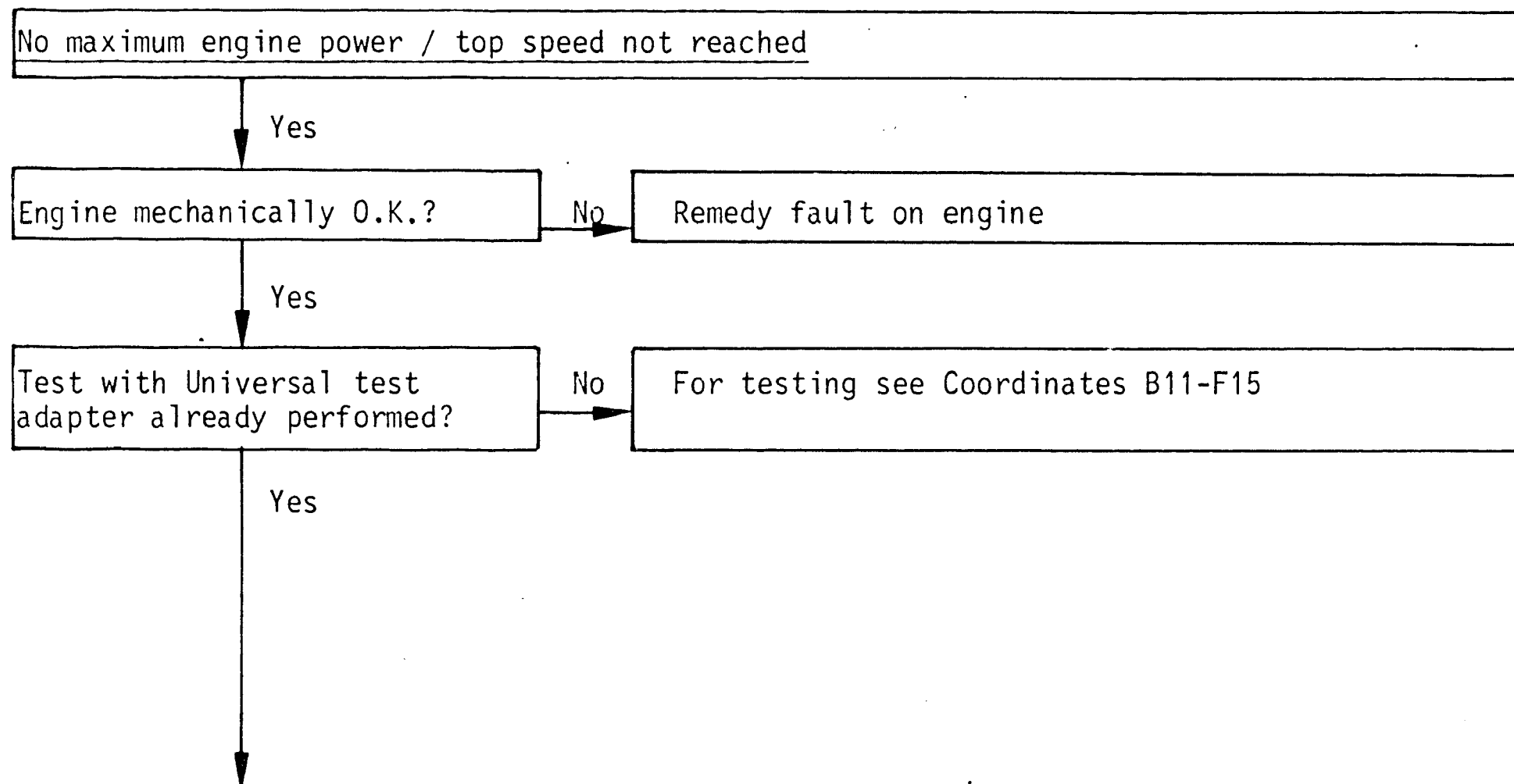
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on J5/J6

J3

No maximum engine power
Porsche 944



J4

No maximum engine power
Porsche 944



No maximum engine power / top speed not reached (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage section: Distributor cap oil-fouled inside and outside? (Remove distributor rotor and check camshaft seal).

Note:

Is the clip of the distributor cap fitted correctly? For fitting, we recommend removing the ignition cable from cyl. 3 at the distributor cover, in order to improve access to the lower clip.

When connecting the H.T. ignition cables note the cylinder numbers. Do not forget the hood and screening cover. Check the primary side of the ignition coil for continuity (approx. 0Ω). Secondary resistance: 5 to 7.2 $k\Omega$. Check interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistance in:

ignition-distributor rotor	1 $k\Omega$
ignition-distributor outer dome	1 $k\Omega$
ignition-distributor center dome	1 $k\Omega$
spark-plug connectors	3 $k\Omega$
spark plugs	approx. 5 $k\Omega$
ignition coil	0 $k\Omega$

Yes

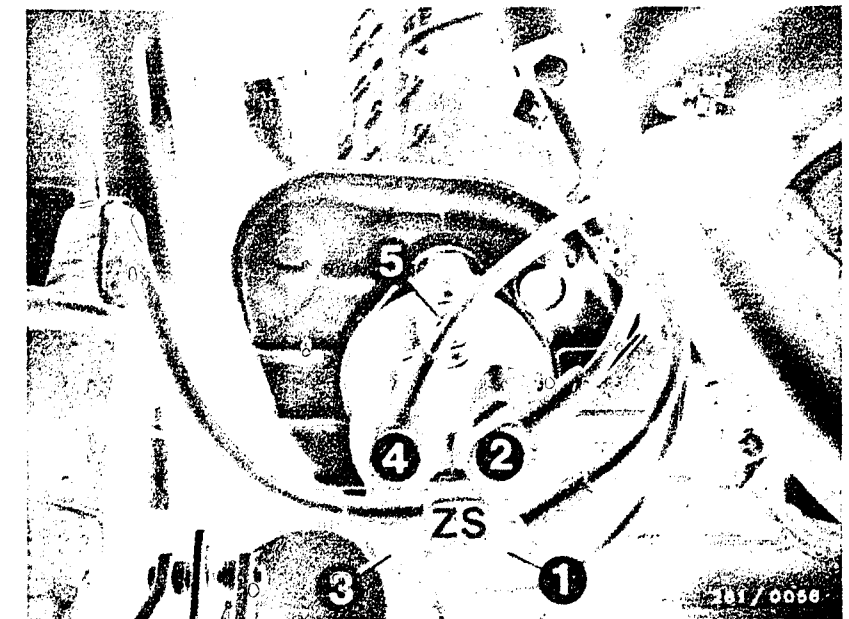
Does throttle valve open fully?

No

Throttle linkage, accelerator pedal O.K.? Straighten linkage if necessary. Throttle linkage may stick due to floor mat etc. Adjust throttle cable. Check pressure point for kickdown.

Yes

Continued on J7/J8



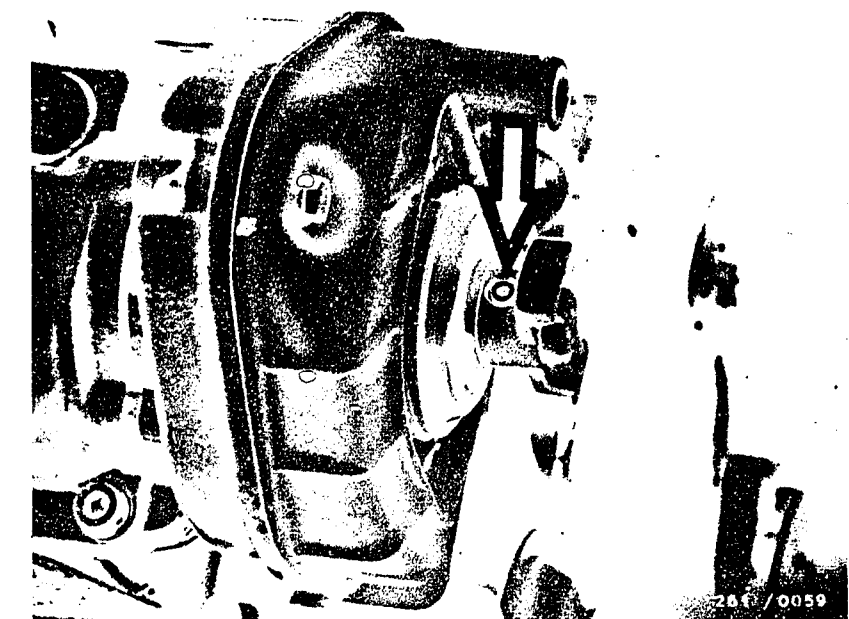
High-voltage distributor

1 to 4 = Cylinder numbers

ZS = High-tension cable to ignition coil

5 = Clip

Arrow = Ignition-distributor rotor (screwed)



J5

No maximum engine power
Porsche 944



J6

No maximum engine power
Porsche 944



No maximum engine power / top speed not reached (continued)

Yes

Fuel pressure at full load O.K.?

No

Test the fuel pressure on a chassis dynamometer at rated speed and rated power: Connect pressure gauge to test connection of fuel-distribution pipe.
Note: When opening the cap nut, pay attention to the fitted bearing.
Collect any fuel which runs out. Danger of fire with engine hot and with sparks.

Test specification at full load:

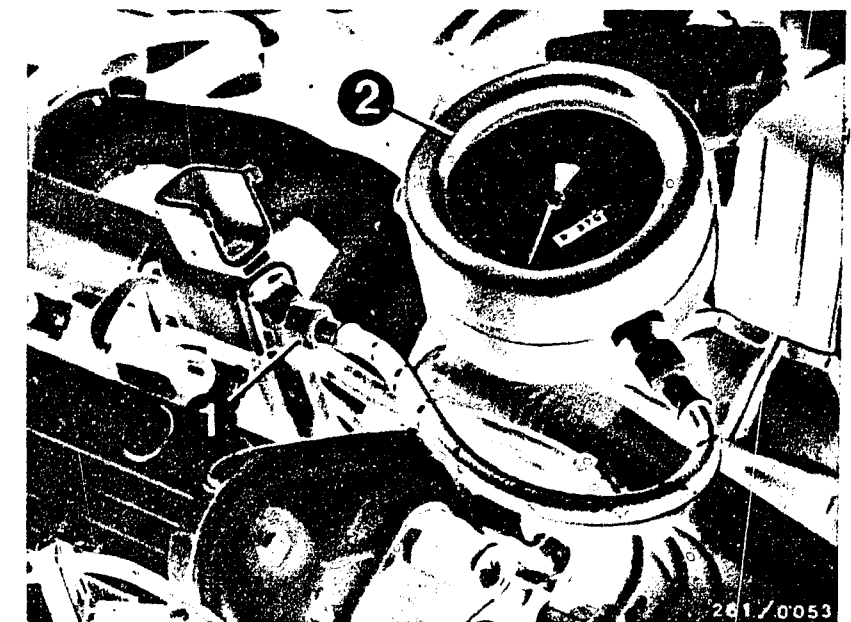
2.3...2.7 bar
(Reading may fluctuate slightly)

Remedy if test specification not reached:

- Fuel filter clogged → replace
- Voltage at fuel pump plugs, with engine running min. 12 V → clean contacts, possibly eliminate poor ground connection, replace leads.
- Fuel pressure regulator defective → replace
- Fuel pump delivery too low → replace fuel pump.
- Strainer in tank clogged? Corrosion in tank?

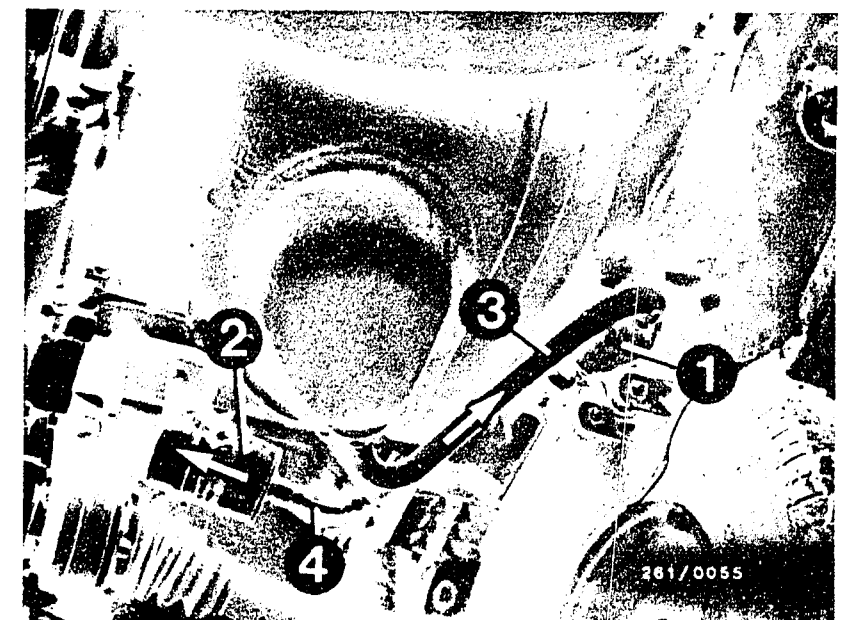
Yes

Continued on J9/J10



1 = Test connection
2 = Pressure gauge

1 = Fuel pump
2 = Fuel filter
3 = Fuel suction line
4 = Fuel pressure line
Arrows = Fuel flow direction



J7

No maximum engine power
Porsche 944

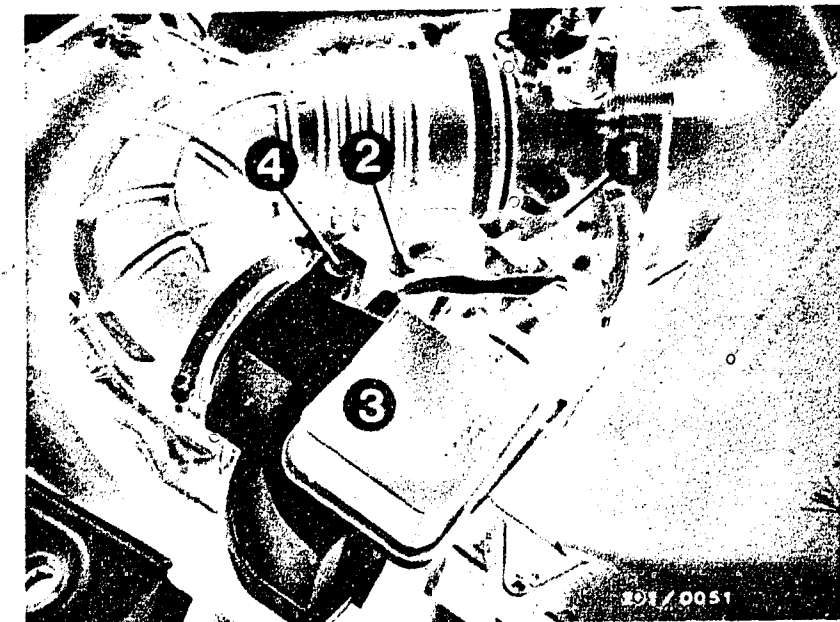
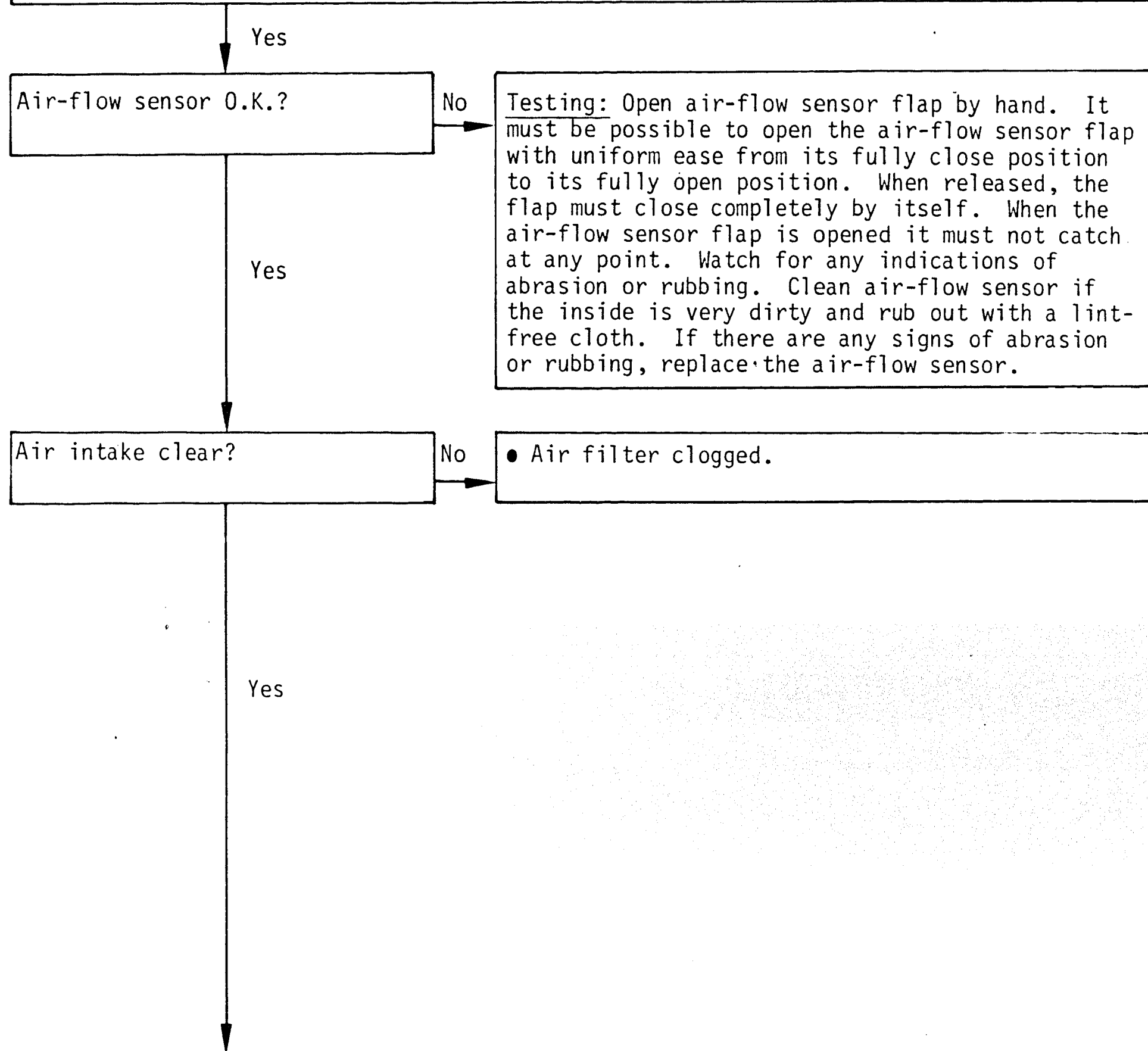


J8

No maximum engine power
Porsche 944



No maximum engine power / top speed not reached (continued)



- 1 = Throttle-valve switch
- 2 = Temperature sensor engine (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Mixture-adjustment screw

Continued on J11/J12

J9

No maximum engine power
Porsche 944



J10

No maximum engine power
Porsche 944



No maximum engine power / top speed not reached (continued)

Yes

Fuel delivery O.K.?

No

Measuring the fuel delivery:
For testing, undo the junction between the fuel return hose (from pressure regulator) and fuel return line (to fuel tank). If necessary, extend hose and lead into a 5 l vessel with graduated scale. Switch on fuel pump.

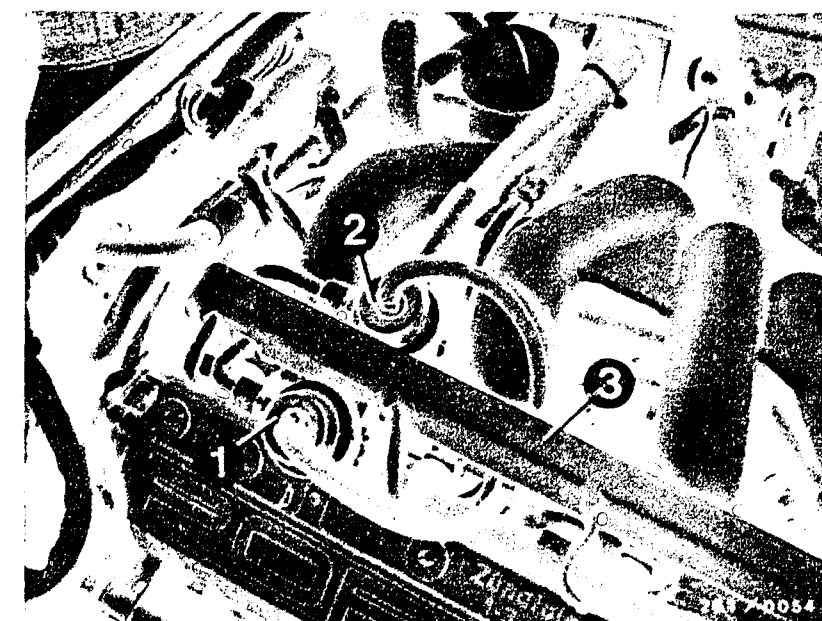
Test specification: min. 850 cm³/30s

Remedy if test specification not reached:

- Fuel filter clogged → replace
- Voltage at fuel pump plugs, with engine running min. 12 V → clean contacts; possibly also eliminate poor ground connection, replace leads.
- Fuel pressure regulator defective → replace
- Fuel pump delivery too low → replace fuel pump
- Strainer in tank clogged? Corrosion in tank?

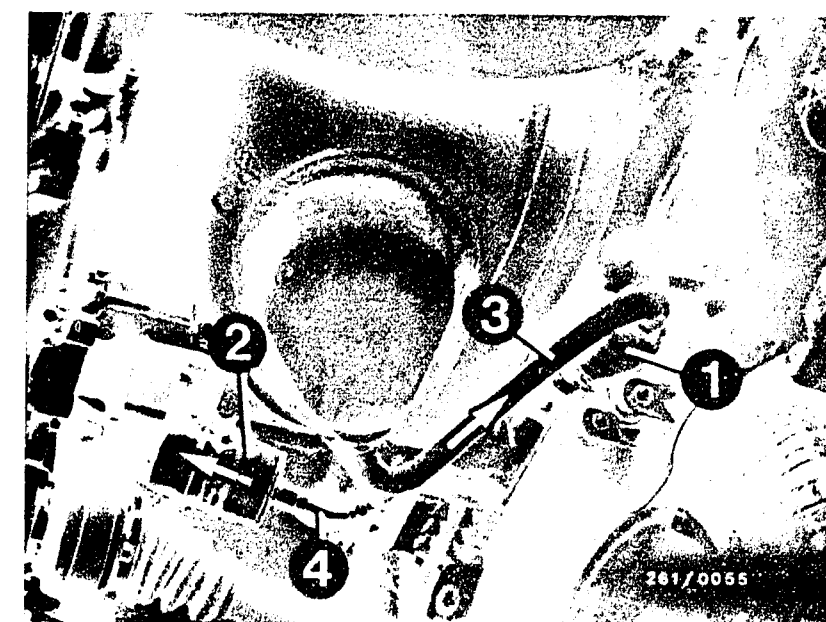
Yes

Continued on J13/J14



- 1 = Pressure regulator
- 2 = Fuel-line-pressure damper
- 3 = Fuel-distributor pipe
- 4 = Air hose to intake manifold
- 5 = Return hose

- 1 = Pressure regulator
- 2 = Fuel filter
- 3 = Fuel suction line
- 4 = Fuel pressure line
- Arrow = Fuel-flow direction



J11

No maximum engine power
Porsche 944



J12

No maximum engine power
Porsche 944



No maximum engine power / top speed not reached (continued)

Yes

Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.
Checking for leaks: Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak. Check electric contacts for loose connection.

Yes

Testing completed for customer complaint

"No maximum engine power".

Customer complaint remedied?

No

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3... B10). If the fault has not been detected by "direct troubleshooting", see "detailed troubleshooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

J13

No maximum engine power

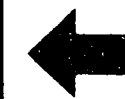
Porsche 944



J14

No maximum engine power

Porsche 944



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

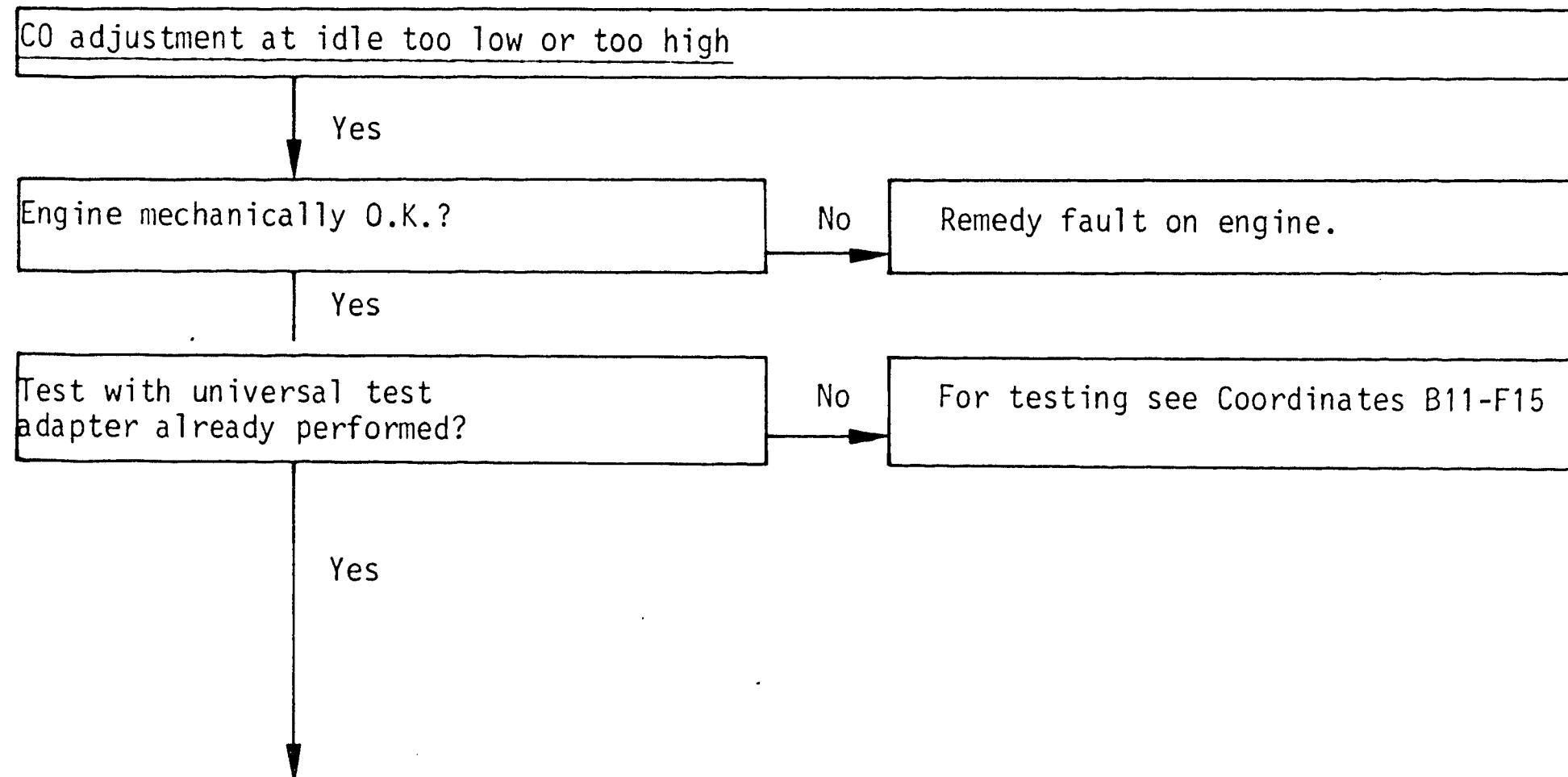
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on J17/J18

J15

CO adjustment
Porsche 944

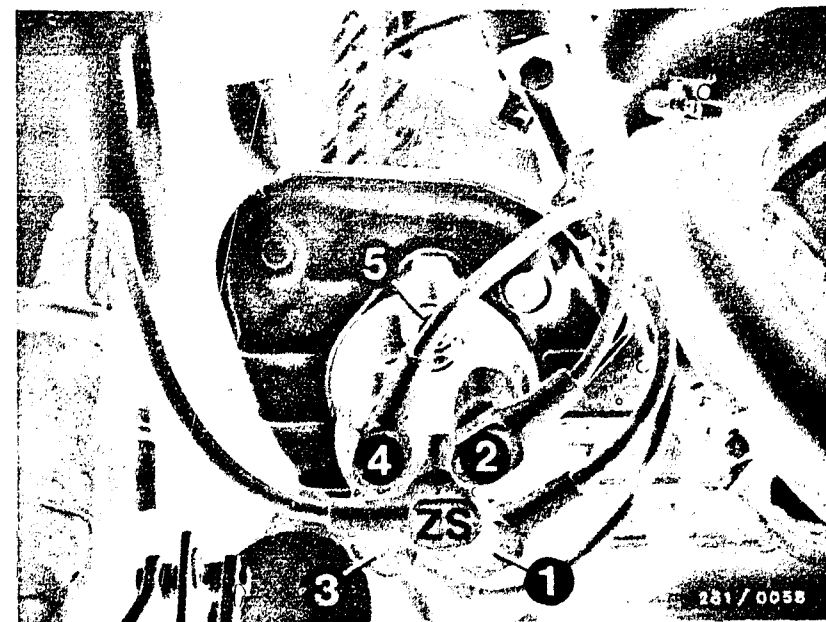
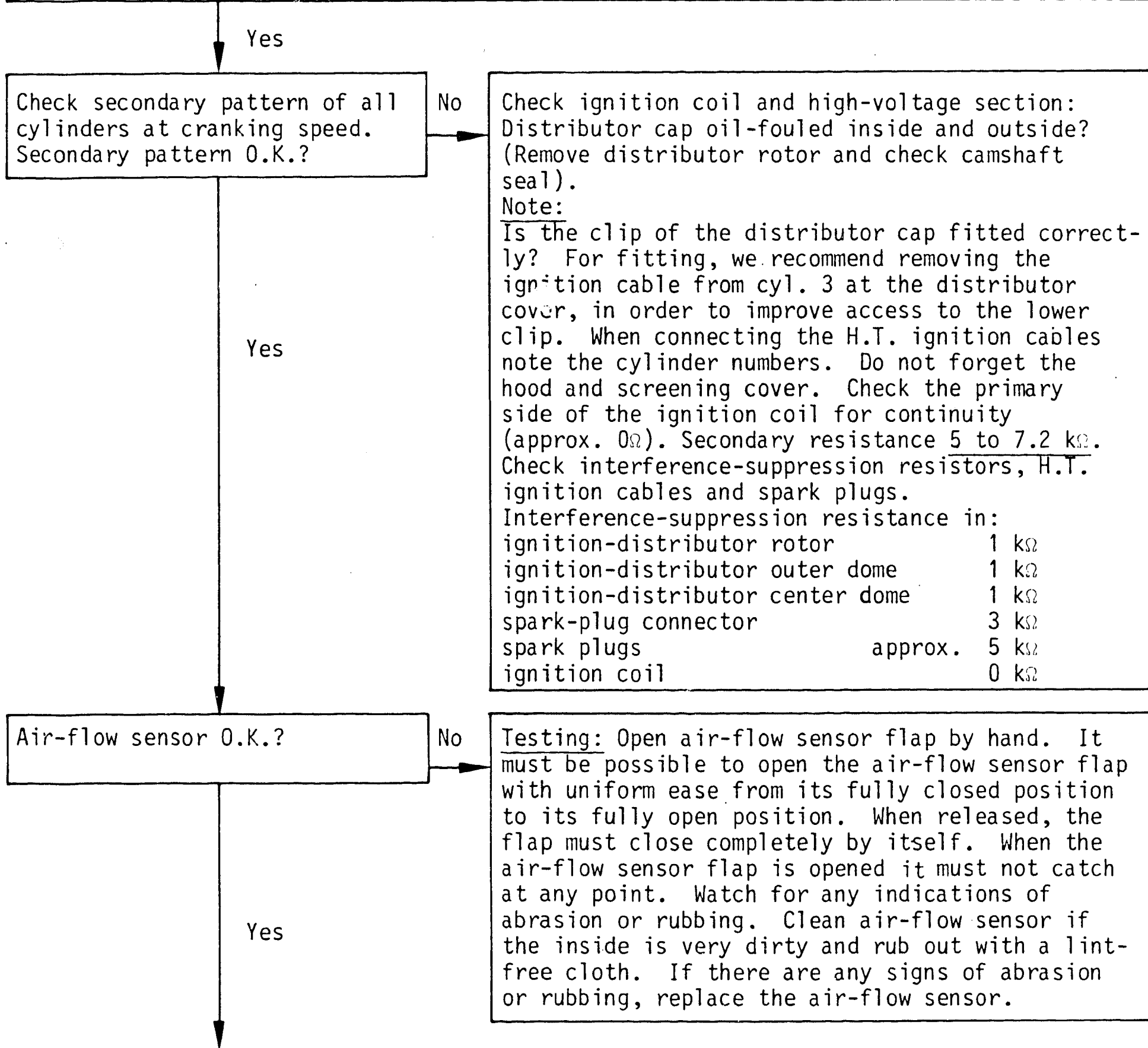


J16

CO adjustment
Porsche 944

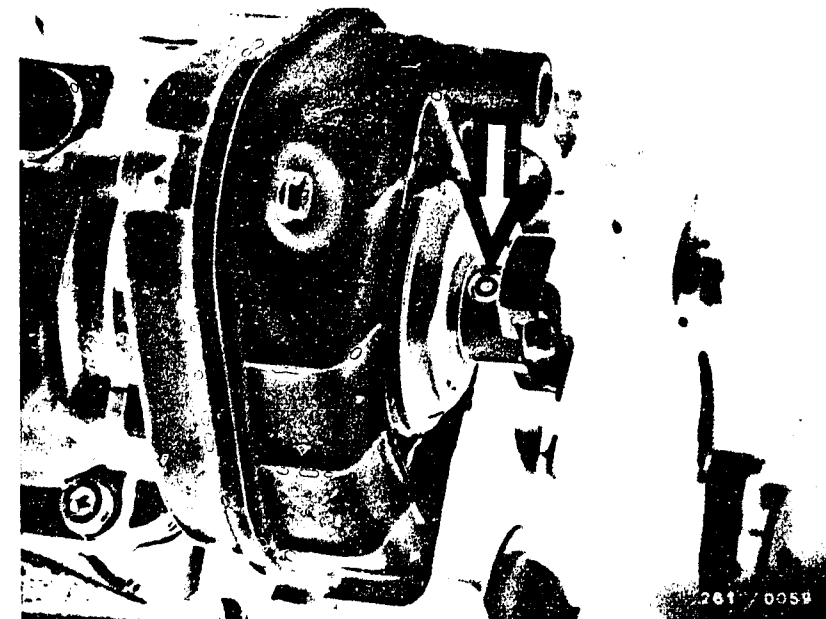


CO adjustment at idle too low or too high (continued)



High-voltage distributor
1 to 4 = Cylinder numbers
ZS = High-tension cable to ignition coil
5 = Clip

Arrow = Ignition-distributor rotor (screwed)



Continued on J19/J20

J17

CO adjustment
Porsche 944



J18

CO adjustment
Porsche 944



CO adjustment at idle too low or too high (continued)

Yes

Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

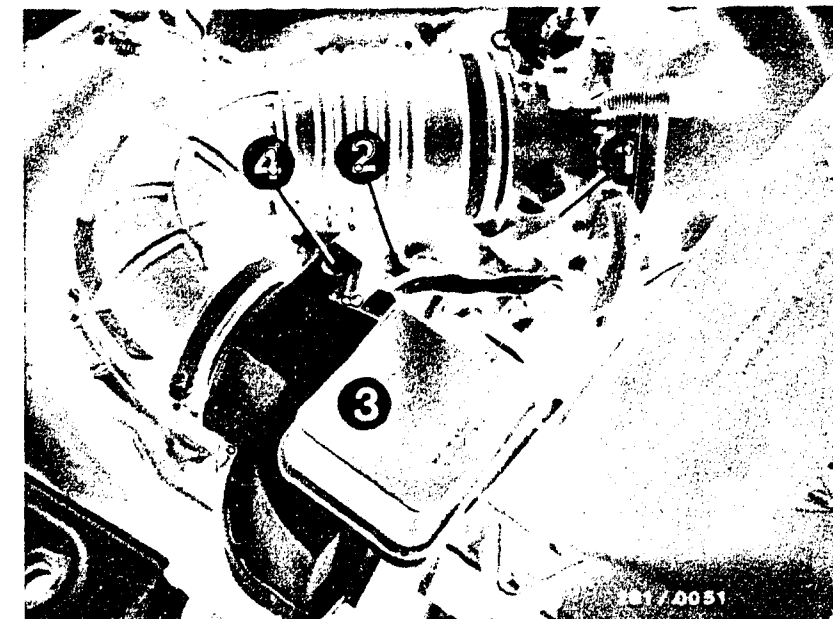
No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Checking for leaks: Seal off exhaust tail pipe: Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak. Check electric contacts for loose connection.

Yes

Continued on J21 /22



- 1 = Throttle-valve switch
- 2 = Temperature sensor engine (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Mixture-adjustment screw

J19

CO adjustment
Porsche 944

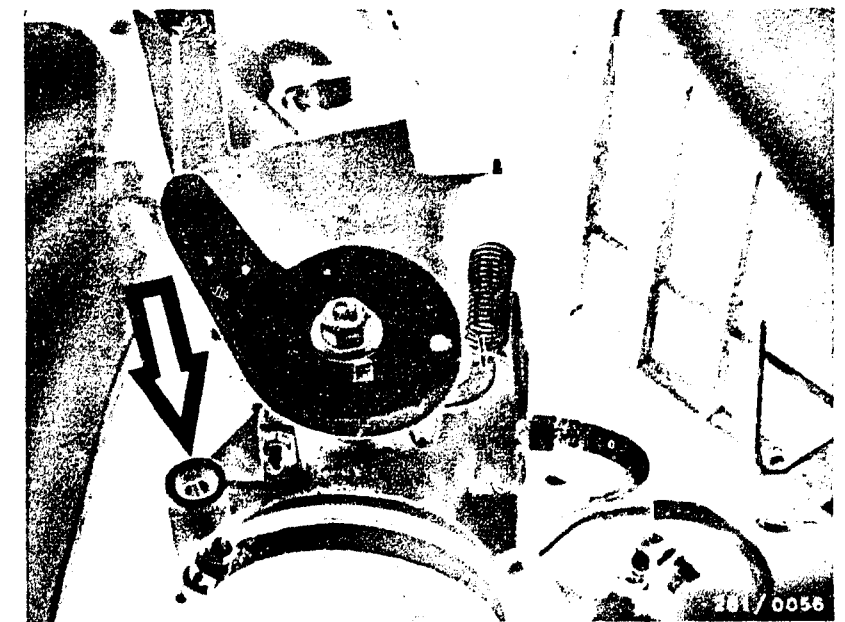
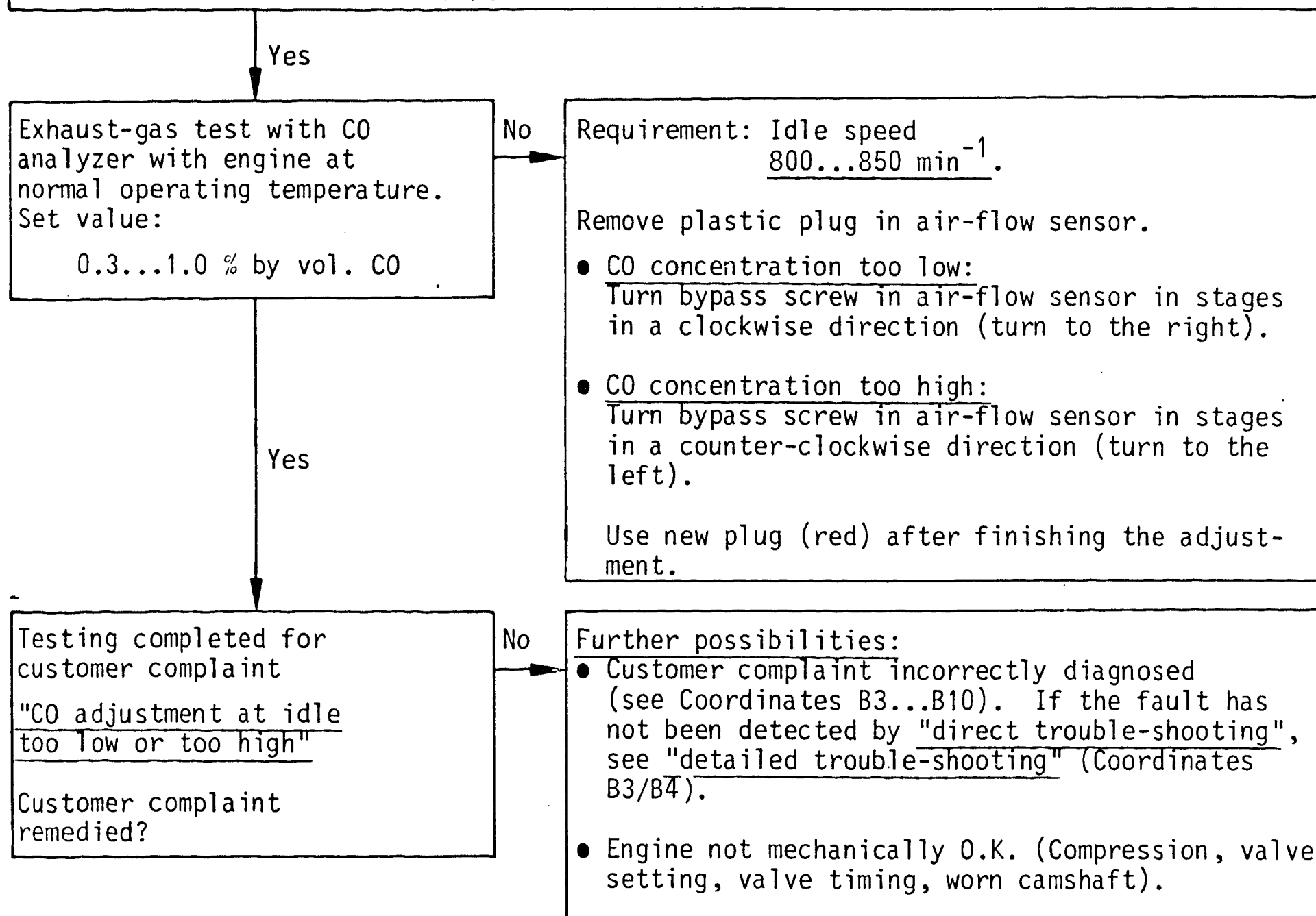


J20

CO adjustment
Porsche 944

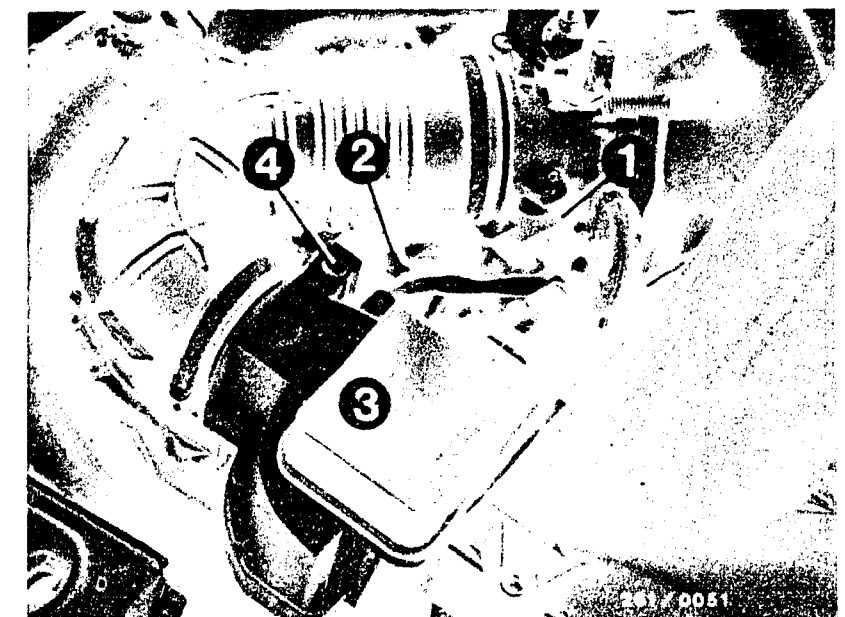


CO adjustment at idle too low or too high (continued)



Arrow = Idle-speed adjusting screw

- 1 = Throttle-valve switch
- 2 = Temperature sensor engine (NTC II)
- 3 = Air-flow sensor with NTC I
- 4 = Mixture-adjustment screw



After-sales Service

Motor Vehicle Service Information

Only for use within the Bosch organization. Not to be communicated to any third party.

PORSCHE 944
with Motronic

VDT-I-POR 021 En
12.1981

As of July 1981 Porsche is installing the Motronic in the 944 model.
The construction and operating principle of the Motronic are described in Technical Bulletin "New Product" VDT-I-261/2.

Testing

On account of different wiring in the control-unit plug it is not possible to use the previous Motronic test adapter ETT 018.00 (Part No.: 0 684 101 800) for testing.

As of February 1982 the After Sales Service Organisation will be provided with the universal test adapter ETT 018.01 with which the Motronic and other systems can be tested. A precise description of the test adapter is being prepared.

Urgent after-sales service cases

If problems occur on vehicles equipped with the Motronic in the period prior to the availability of the universal test adapter, please inform KH/VKD2.

Published by:

Robert Bosch GmbH
Division KH
Technical After-Sales Service
(KH/VKD 2)

Please direct questions and comments
concerning the contents to our authorized
representative in your country.

BOSCH

Geschäftsbereich KH, Kundendienst, Kfz-Ausrüstung
© 1981 Robert Bosch GmbH, D-7 Stuttgart 1 Postfach 50. Printed in the Federal Republic of Germany.
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH.

L1

Motor Vehicle Service Information

Porsche 944



After-sales Service

Motor Vehicle Service Information

Only for use within the Bosch organization. Not to be communicated to any third party.

PORSCHE 944 WITH MOTRONIC

VDT-I-POR 020 En

Setting the PCB switch on
control unit 0 261 200 006

12.1981

The PCB switch offers the possibility of influencing the spark advance and of an additional mixture adaptation.

Detailed information on the PCB switch is to be found in the Service Information sheet VDT-I-BMW 032 En.

Differences are listed below.

Important note:

In order to adapt to variations in fuel quality, the PCB switch must be set to switch position 7 (right-hand stop) for vehicles which are supplied to certain countries. This concerns the following Porsche export countries: Belgium, France, Greece, Great Britain, Portugal and Spain.

There is no change in the Bosch part number since Porsche carries out the adjustment itself for organizational reasons.

Porsche changes its own number on converted control units from 944.618.111.00 to 944.618.111.03 whereby the final digits 03 are merely stuck over the existing number.

All control units supplied by Bosch are set at the factory to switch position 0 (left-hand stop). Prior to installation of the control units in vehicles for the above-mentioned countries, the PCB switch must be set to switch position 7 (right-hand stop).

Be sure to follow the setting instructions given in Service Information Sheet VDT-I-BMW 032 En.

Use the special tool KDMT 001 for adjusting the PCB switch. Use a new cap (red) after adjusting.

BOSCH

Geschäftsbereich KH Kundendienst Kfz Ausrüstung
by Robert Bosch GmbH, D-7 Stuttgart 1 Postfach 50 Printed in the Federal Republic of Germany
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

L2

Motor Vehicle Service Information

Porsche 944



Switch position and corresponding range of application for control unit 0 261 200 006

Switch position	Adjustment range for mixture (C0)	Spark advance correction	Range of application
0 (Left-hand stop)	Basic setting = Bosch factory setting		General setting for countries with fuel quality above 98 RON (octane number). C0 adjustable by means of air-flow sensor mixture-adjusting screw.
1	Richer + 3% (Duration of injection extended by 3%, starting from 1% C0 the C0 rises to approx. 2 to 2.5%)	0 (Unchanged)	Complaints: Bucking, C0 not sufficiently adjustable via mixture-adjusting screw in air-flow sensor. First of all check: valve setting, idle contact, unmetered air. Increased fuel consumption can occur.
2	Leaner - 3% (Duration of injection shortened by 3%)	0	Complaints: Consumption too high, mixture too rich, adjustment by means of mixture-adjusting screw in air-flow sensor not possible.
3	Richer + 6% (Duration of injection extended by 6%)	0	Complaints: As under switch position 1, but greater enriching necessary. If required, adjust idle C0 via mixture-adjusting screw.
4	0 (As basic setting)	-2.76° crankshaft (Retard)	Setting for countries with fuel below 98 RON (octane number). Increased fuel consumption can occur.
5	Richer + 3% (As switch position 1)	-2.76° crankshaft (Retard)	If a correction was already set before with switch position 1, 2 or 3, the appropriate switch position 5, 6 or 7 must be set. Note in the event of possible switch resetting.
6	Leaner - 3% (As switch position 2)	-2.76° crankshaft (Retard)	
7 (Right-hand stop)	Richer + 6% (As switch position 3)	-2.76° crankshaft (Retard)	Setting for the following countries: Belgium, France, Greece, Great Britain, Portugal and Spain. Generally the range of application for switch positions 4 to 6 also applies.

Please direct questions and comments concerning the contents to our authorized representative in your country.



After-sales Service

Motor Vehicle Service Information

Only for use within the Bosch organization. Not to be communicated to any third party.

BMW 635 CSi, 735 CSi,
633 CSi, 733 i

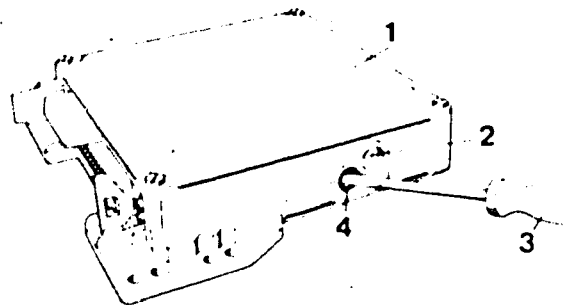
VDT-I-BMW 032 En
10.1980

Motronic control unit
with PC-board switch

As from August 1980, the control units 0 261 200 002 for the 635 CSi and 735 i, the 0 261 200 004 for Sweden and Australia and later-models a PC-board switch which is accessible from outside the unit (Fig. 1). The introduction of this switch means that workshop personnel have the possibility of changing the ignition point and are also provided with an additional mixture adaptation facility. The values for mixture and ignition correction/adaptation are held within relatively tight limits. They were selected in order that with this PC-board switch in any position, damage cannot normally occur to the engine provided that the prescribed gasoline/petrol is used. Unnecessary adjustment to the switch though, leads to poor driveability, and particularly to "search" during overrun and increased fuel consumption.

Fig. 1

- 1 = Control unit
- 2 = Diode
- 3 = Screwdriver
- 4 = PC-board switch cap



Ignition-point correction

The quality of the gasoline on sale in a variety of countries does not always comply with the standard required for this engine. It is therefore recommended that for journeys in countries where the premium gasoline (super-grade petrol) octane number (research method) is below 98 a correction is carried out to the ignition point by means of the PC-board switch. At the moment, this applies to the following countries:

Bulgaria, Czechoslovakia, DDR, Greece, Hungary, Poland, Rumania, Spain and Turkey.

The correction of the ignition point by 4.5° crankshaft in the "retard" direction applies across the whole of the ignition-point map and prevents the "ping" and "knock" which are dangerous for the engine.

The adjustment of the ignition point leads, inevitably, to an increase in fuel consumption.

For this reason, as soon as the journey has been completed for which such an adjustment was carried out, the original setting must be adjusted again.

BOSCH

Geschäftsbereich KH, Kundendienst, Kfz-Ausrüstung
© by Robert Bosch GmbH D-7 Stuttgart 1 Postfach 50. Printed in the Federal Republic of Germany
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

L4

Motor Vehicle Service Information

Porsche 944



Mixture adjustment

As is already known, the CO-adjustment takes place through the idle-mixture screw in the air-flow sensor. This is still the case and no change has taken place here. The PC-board switch though, apart from changing the ignition point also provides an additional possibility of adjusting the mixture. The PC-board switch is operative over the complete range as opposed to the bypass in the air-flow sensor which is only effective at idle and lower part-load range. For this reason, a change in the mixture using this switch is only justified when it is absolutely certain that defects are not present on the engine (i.e. valves, intake system, exhaust), the fuel-injection system or the ignition.

The Motronic is checked using the after-sales service instructions which have already been issued.

Further details can be taken from the Table on the last page of this Service Information.

Special adjustment pin KDMT 0001 for the PC-board switch (Fig.2)

Bosch has developed a special tool to facilitate the professional adjustment of the PC-board switch. The tool is of plastic material and, in order to prevent damage to the valuable control unit when the switch is forced up against the stop, the triangular end breaks off when too much force is used.

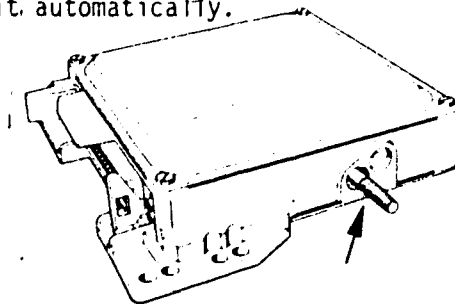
NEVER use a screwdriver to adjust the PC-board switch.

The special tool KDMT 0001 is available through the usual channels or directly from KH/VKD 4.

Subscribers to the tool program receive it automatically.

Fig. 2

Adjustment pin KDMT 0001
fitted in control unit (arrow)



Adjusting the PC-board switch

Remove the control unit (see After-sales service instructions)

Using a screwdriver, carefully remove the cap (Fig. 1)

In order to do this, insert a wide-bladed screwdriver into the cap at an angle (Fig. 1). Carefully push through the cap and remove it. Take care that the PC-board is not knocked or otherwise contacted in the process.

The hole (triangular polygon) is now free for insertion of the special tool KDMT 0001.

Due to the danger of destroying or damaging the control unit metallic objects or screwdrivers are NOT to be used



Using a minimum of force, turn the PC-board switch to its left-hand stop (Fig. 3). If already adjusted, count the number of "click" positions and note them down.

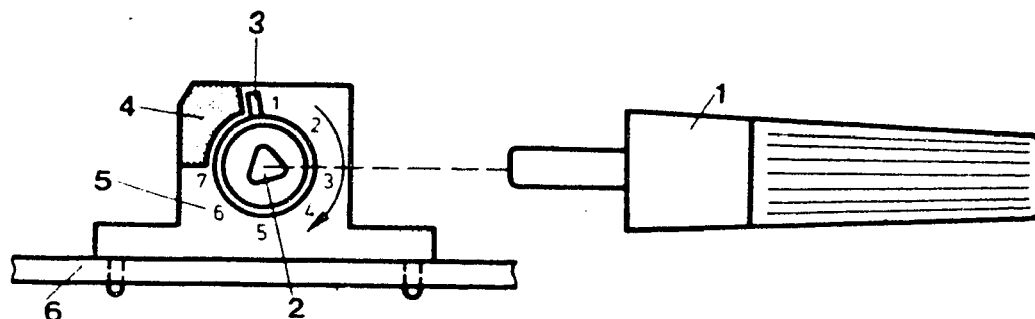
Select the new switch position according to the following Table.

Count the number of "click" positions starting from the left-hand stop.

Take into account the fact that the switch has defined detent positions and intermediate positions are not possible.

Check that the setting is correct by using the CO-analyzer and taking the vehicle on a test run.

Fig. 3



After the adjustment has been completed, a new cap (red) MUST be fitted in the hole in the control unit. This is important because it guarantees protection against humidity and prevents unauthorized tampering.

Part number for red cap : 1 280 508 012

Note: Black and blue caps are only fitted by either Bosch or BMW at the works.

Fig. 3

- 1 = Adjustment pin KDMT 0001
- 2 = Bore (triangular polygon)
- 3 = Basic setting (left-hand stop)
- 4 = End stop
- 5 = Switch positions ("click" or detent positions)
- 6 = PC board



Technical Bulletin

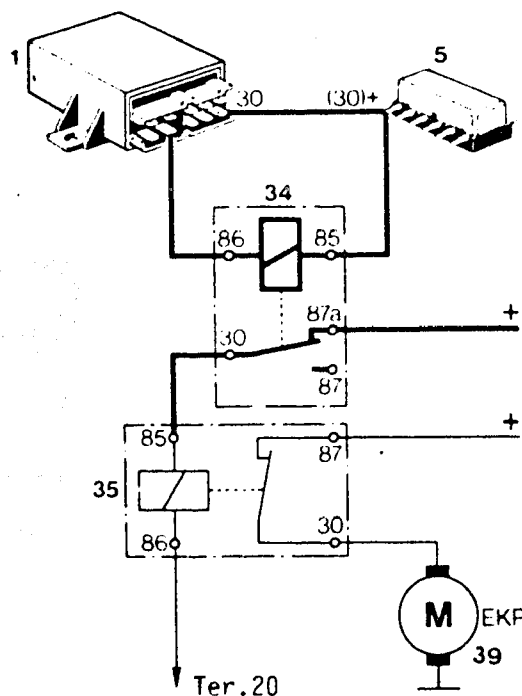
Only for use within the Bosch organization. Not to be communicated to any third party

CAR ALARM II - 0 335 411 901
in vehicles with Motronic

VDT-I-335/110 En
10.1981

When Car Alarm II (0 335 411 901) was fitted at a later stage into a vehicle with a Motronic-equipped engine (e.g. BMW and Porsche), we used to recommend switching off the voltage supply of the Motronic control unit as a means of protection against theft. Please do not use this circuit any more. It will be replaced by the following, new circuit in which the electric fuel-pump relay is switched off via the "primed" alarm system.

Wiring diagram
for Motronic



- 1 = alarm relay
5 = fuse box
34 = additional relay 0 332 204 150
(formerly 0 332 204 125)
35 = electric fuel-pump relay
39 = electric fuel-pump
Ter.20 = cable to terminal 20 on
Motronic control unit

BOSCH

Geschäftsbereich KH Kundendienst Kfz-Ausrüstung
© by Robert Bosch GmbH D-7 Stuttgart 1 Postfach 50 Printed in the Federal Republic of Germany
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

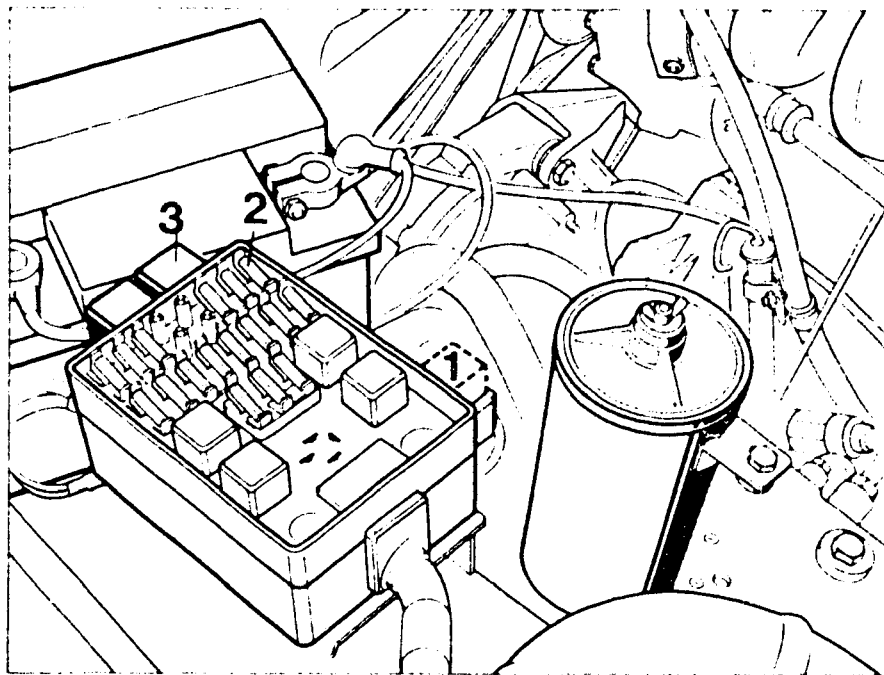
L7

Technical Bulletin

Porsche 944

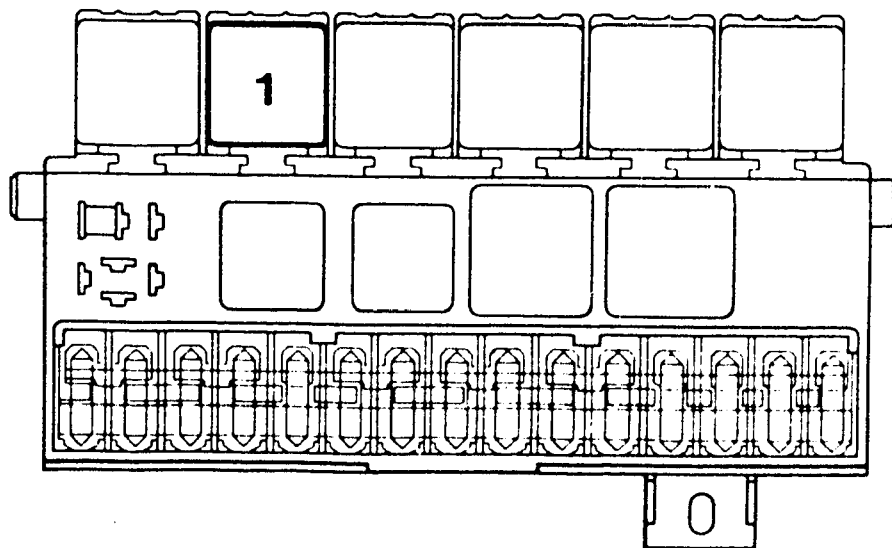


Mounting position of the relay for the electric fuel-pump in BMW vehicles



- 1 = electric fuel-pump relay (position until 8.1980)
- 2 = fuse (16 A) for electric fuel-pump
- 3 = electric fuel-pump relay (position as from 8.1980)

Mounting position of the relay for the electric fuel-pump in Porsche vehicles



- Central electronics
- 1 = electric fuel-pump relay



After-sales Service

Technical Bulletin

Only for use within the Bosch organization. Not to be communicated to any third party.

22

Danger of Accident on Semi-conductor Ignition Systems

VDT-I-227/102 B

11.1976

Please be sure to pass this bulletin on to your employees for their attention.

The increased demands made on their ignition systems by modern engines, and the wish for freedom from maintenance, led some time ago to manufactures starting to equip their vehicles with semi-conductor ignition systems as original equipment. In most cases the performance of nearly all makes of such systems is higher than that of conventional systems, and further improvements are to be expected. This means that semi-conductor ignition systems have reached the point where contact with "live" parts or contacts (whether on the primary side or the secondary side) can prove fatal.

In this connection we should like to point out to you that the laws valid in your country regarding work on high-voltage systems must be adhered to when working on, or testing, semi-conductor ignition systems.

As a matter of principle, when working on such ignition systems the ignition is to be switched off. Included in such work are the following operations:

- Connection of engine testing equipment (timing light, dwell-tach tester, ignition oscilloscope etc.).
- Replacement of ignition system parts (spark plugs, ignition coil, ignition distributor, H.T. ignition cables etc.).

If it is necessary to switch on the ignition in order to test the system or make adjustments on the engine (to the carburetor for instance), then lethal voltages are present throughout the entire system.

This means that the danger of accident exists not only at individual components in the system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also at the wiring harness (e.g. connection for the tachometer, diagnostic connector), on terminals, and on test equipment.

BOSCH

Geschäftsbereich KH Kundendienst Kfz-Ausrüstung
© by Robert Bosch GmbH D-7 Stuttgart 1 Postfach 50 Printed in the Federal Republic of Germany
imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

L9

Technical Bulletin

Porsche 944

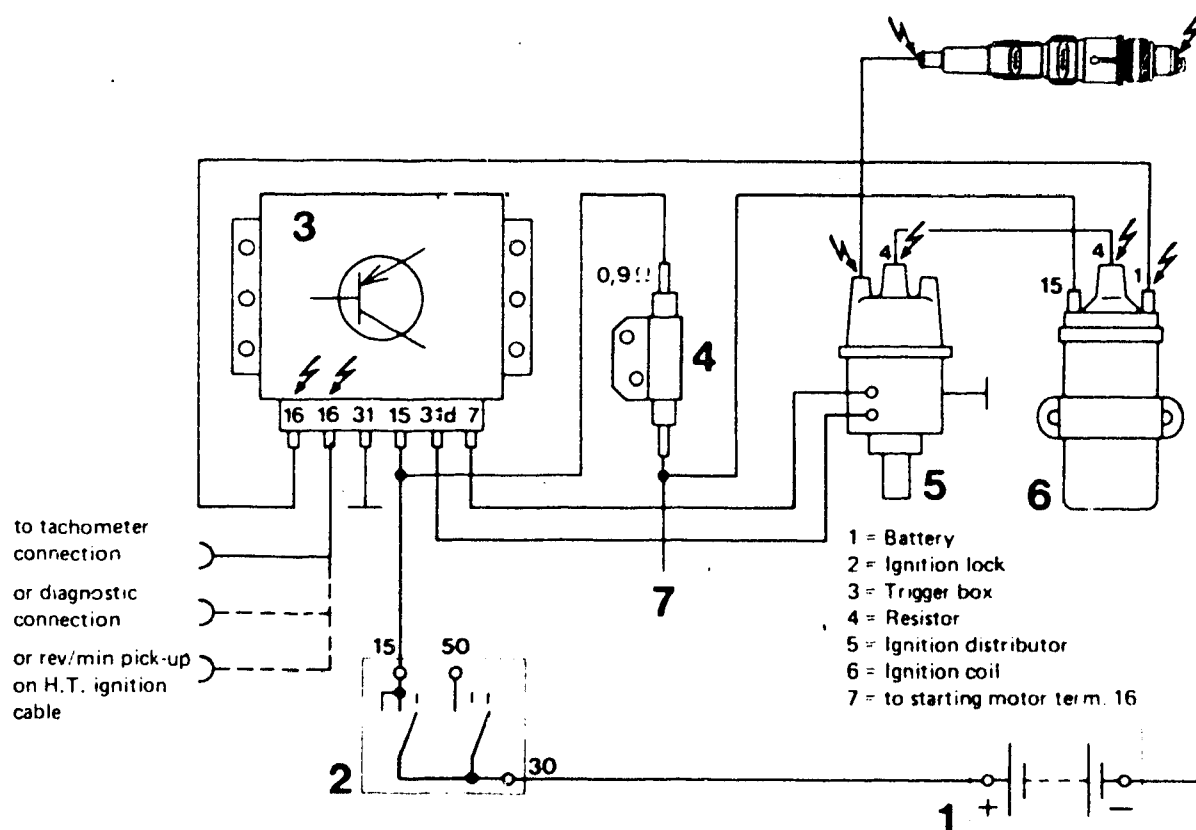


In addition, in the case of the capacitor-discharge ignition system (CDi), danger of accident is also present under the following circumstances:

- Operation of the trigger box without the ignition transformer.
- At the trigger box, (removed), relatively soon after it has been switched off (capacitor discharge).

Below is a typical terminal diagram of a semi-conductor ignition system, the danger points are marked with red high-voltage arrows. We would point out that all semi-conductor ignition systems, even the older ones, are to be regarded as dangerous in the sense as defined by this bulletin.

Please address any queries or comments concerning the contents of this publication to our representative in your country.



Terminal diagram



After-sales Service

Technical Bulletin

Only for use within the Bosch organization. Not to be communicated to any third party

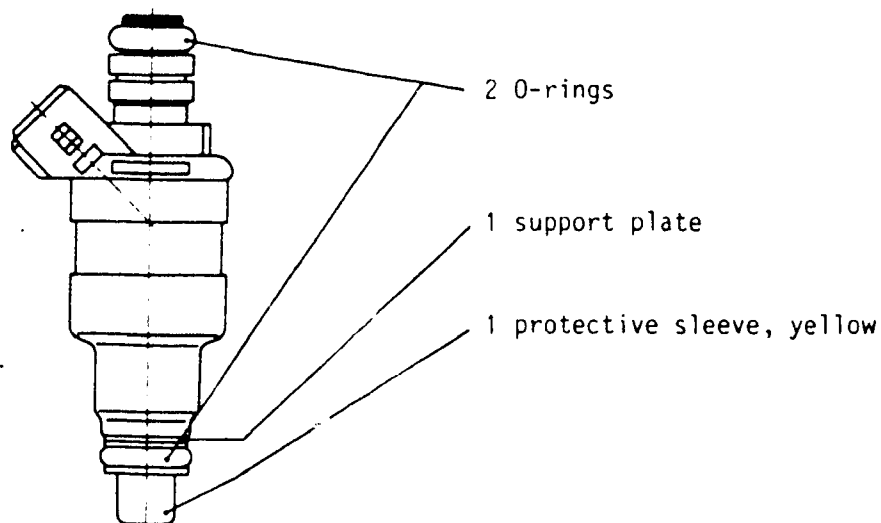
PARTS SET FOR ELECTRONIC FUEL-INJECTION VALVES

VDT-I-261/102 En

0 280 150 2..

8.1982

A parts set is available for the Motronic electronic fuel-injection valves with the new method of connection. The set consists of:



Since the above mentioned parts are subjected to extreme temperature stress, they should be exchanged for new parts whenever servicing is carried out. "Unmetered air" sucked in through injection-valve seals which are not tight, is a frequent case for servicing.

The parts set has the number 1 287 010 704 and will in future be listed in the service parts microfiche under electronic fuel-injection valves.

BOSCH

Geschäftsbereich KH Kundendienst Kfz-Ausrüstung
© by Robert Bosch GmbH D-7 Stuttgart 1, Postfach 50 Printed in the Federal Republic of Germany
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

L11

Technical Bulletin

Porsche 944



Table of contents

When direct trouble-shooting a specific Motronic component it is absolutely essential to look up the respective component under the corresponding customer complaint.

<u>Section</u>	<u>Coordinates</u>
Microfiche layout.....	A 1
1. Rapid check list.....	A 2 - A 10
2. Test specifications.....	A 11 - A 12
3. Electrical terminal diagram.....	A 13 - A 14
4. Installation position of components...	A 15 - A 17
5. Diagram of fuel lines.....	A 18
6. Test equipment and tools.....	A 19 - A 20
7. General information.....	A 21 - A 24
8. Trouble-shooting.....	B 1 - B 10
8.1 Detailed trouble-shooting.....	B 3 - B 4
8.2 Direct trouble-shooting.....	B 5 - B 10
9. Test with Motronic test adapter.....	B 11 - F 15



10. Trouble-shooting program according to customer complaints

Customer complaint:

Starting motor operates, engine fails to start or starts only with great

difficulty.....	F 16 - G 4
Secondary patterns.....	F 18
Injection valves.....	F 18 - F 21
Auxiliary-air device.....	F 22
Air-flow sensor.....	G 1
Hose lines, electric lead connections and leak test.....	G 1

Customer complaint:

Engine starts but then dies.....	G 5 - G 12
Hose lines, electric lead connections and leak test.....	G 7
Auxiliary-air device.....	G 9
Air-flow sensor.....	G 11

Customer complaint:

Uneven engine idle.....	G 13 - G 24
Secondary patterns.....	G 15
Air-flow sensor.....	G 15
Hose lines, electric lead connections and leak test.....	G 17
Auxiliary-air device.....	G 19
Start valves.....	G 21
Engine-speed and CO adjustm	G 23



Customer complaint:

<u>Poor throttle take-up.....</u>	H	1	- H	10
<u>Secondary patterns.....</u>	H	3		
<u>Air-flow sensor.....</u>	H	5		
<u>Hose lines, electric lead connections</u>				
<u>and leak test.....</u>	H	5		
<u>Auxiliary-air device.....</u>	H	7		

Customer complaint:

Engine missing under all operating

<u>conditions.....</u>	H	11	- H	20
<u>Secondary patterns.....</u>	H	13		
<u>Plug-in connections.....</u>	H	13		
<u>Fuel delivery.....</u>	H	15		
<u>Control unit.....</u>	H	15		
<u>Air-flow sensor.....</u>	H	17		
<u>Generator.....</u>	H	19		
<u>Interference-suppression devices.....</u>	H	19		
<u>Spark-plug connectors.....</u>	H	19		

Customer complaint:

<u>Fuel consumption too high.....</u>	H	21	- J	2
<u>Secondary patterns.....</u>	H	23		
<u>Air-flow sensor.....</u>	J	1		

Customer complaint:

No maximum engine power/top speed

<u>not reached.....</u>	J	3	- J	14
<u>Secondary patterns.....</u>	J	5		
<u>Throttle-valve adjustment.....</u>	J	5		
<u>Fuel pressure at full load.....</u>	J	7		
<u>Air-flow sensor.....</u>	J	9		
<u>Air intake.....</u>	J	9		
<u>Fuel delivery.....</u>	J	11		
<u>Hose lines, electric lead connections</u>				
<u>and leak test.....</u>	J	13		



Customer complaint:

CO adjustment at idle too low or too high.....	J 15 - J 22
Secondary patterns.....	J 17
Air-flow sensor.....	J 17
Hose lines, electric lead connections and leak test.....	J 19
Exhaust-gas adjustment.....	J 21

Technical Bulletins and Service Information sheets.....	L 1 - L 11
---	------------

1983 Robert Bosch GmbH
Automotive Equipment - After-Sales Service
Department for Technical Publications KH/VDT,
Postfach 50, D-7000 Stuttgart 1

Published by: After-Sales Service Department for
Training and Technology (KH/VSK). Press date 1.1983.

Please direct questions and comments concerning the contents to our authorized representative in your country.

This publication is only for the use of the Bosch
After-sales Service Organisation, and may not be passed
on to third parties without our consent.

Microfilmed in the Federal Republic of Germany. Micro-
photographié en République Fédérale d'Allemagne par
Robert Bosch GmbH.

